Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

AMERICAN DYESTUFF REPORTER

NOVEMBER 3, 1947
VOLUME 36, No. 22

new

Chromacyl* ORANGE GE

It's new... widening the range of oranges in the "Chromacyl" line. For woolens, suitings, and carpets. Excellent light fastness in pale and full shades. Good fastness to cold and salt water... washing... dry cleaning. Good solubility. Unaffected by metals in dyeing equipment. It's Du Pont's "Chromacyl" Orange GE.

E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Div., Wilmington 98, Del.

*Trade Mark

DU PONT
REG. U.S. PAT. OFF.

Du Pont Dyestuffs

BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

whenever you think of nylon

just think of Supernylite

fast dyes for nylon

light fastness medium shades, 40 to 300 hours

wash fastness 140° F. to 180° F.

Dye Fast Unions on Nylon and Wool.
Dye Fast Unions on Nylon and Rayon or Cotton in combination with SUPER-LITEFAST direct dyes.

Extremely level dying in all percentages, for pastels and heavy shades on piece goods, yarns, etc.

ALTHOUSE
Chemical Company
READING · PA.

Color is a Magic Carpet

Color is the dye craftsman's gift to fashion, lifting fabrics to heights of beauty. To the constant improvement in the colors at his command are devoted the entire research facilities and productive capacities of American Aniline Products, Inc. For expert guidance on any dyeing problem, consult the A.A.P. technicians at any of our branch offices; they will always be glad to help.

AMERICAN ANILINE PRODUCTS, INC.

50 UNION SQUARE, NEW YORK, N. Y.
Plant: Lock Haven, Pa.
Branches: Boston, Mass. · Providence, R. I.
Philadelphia, Pa. · Charlotte, N. C. · Chicago, Ill.
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Dominion Anilines & Chemicals Ltd.
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Henri says . . .

"WAPACO Wool Oil B ees ma cheri. She save my *CHIPPEWA FALLS WOOLEN MILL* much money and much time. Ze reasons?"

WAPACO WOOL OIL B:

1. Gives us CONTINUAL HIGH YIELDS OFF CARD.
2. Eliminates GUMMING of Card Wire and Pitting.
3. Assures SCOURABILITY . . . using less soap and doing a superior job.
4. Allows EXACT ESTIMATE OF PRODUCTION. We process 1500-2500 pounds without stripping cards.
5. Eliminates OXIDATION.
6. Can BE LEFT AROUND INDEFINITELY IN THE GREASE.
7. Produces LESS ENDS DOWN AT THE RUB APRON . . . for more uniformity.
8. PENETRATES . . . does not lie on the surface.
9. MIXES IN HARDEST OF WATERS . . . hot or cold.
10. Allows FIRST BREAKER TO STRIP AS EASILY AS FINISHING BREAKER. Also will strip to base of the wire on all breakers, doffers, workers and strippers.

WATSON-PARK CO. Wapaco Leads BOSTON, MASS.

FACTORY, LOWELL JCT., MASS.

A *Watson-Park* DEMONSTRATOR WILL BE GLAD TO DISCUSS YOUR PROBLEMS WITH YOU. OR WRITE FOR FURTHER INFORMATION.

WATSON-PARK COMPANY

261 FRANKLIN STREET BOSTON, MASS.

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Rubber Rolls

"No. 1" is the universal symbol for Top Grade Crude Rubber. But there is a superlative grade that is even better than No. 1. It is the world's finest Crude Rubber —from selected plantations of outstanding stock—for which Stowe-Woodward, Inc. pay a premium to use in your rolls. *Its symbol is "IX".* IX Premium Rubber is processed with Stowe-Woodward's IX Premium Craftsmanship to give you the finest rubber rolls that money can buy.

STOWE-WOODWARD, INC.

Craftsmen in rubber

NEWTON UPPER FALLS 64, MASSACHUSETTS

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Stowe-Woodward Rolls are made on the West Coast by Huntington Rubber Mills, Inc., Seattle, Washington

DREW'S
NYLON CONING OIL 702

A COMPLETELY SAPONIFIABLE SYNTHETIC ESTER

- **Uniform low viscosity insures even take-up**
- **Promotes clear, uniform stitch**
- **Prevents stripping**
- **Does not stain**
- **Easily removed in scouring**

DREW Tested
YOUR ASSURANCE OF EXCELLENCE

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SUNSHINE and SNOW FLAKES

Crystal-clean, sun-brilliant prints and warm, rich pastels are consistently assured with Keltex, the superior algin thickening agent.

Keltex, a product of nature rigidly refined to assure uniform results, is free of impurities and easily applied. Only a light wash is required for removal.

Adaptable to the pad pigment method of vat dyeing, Keltex provides effective control against pigment migration. It is equally effective in white discharge printing with hydro. In machine or screen printing, Keltex will insure a superior penetration and exact printing paste viscosity.

We will provide complete information on the adaptation of this extremely economical thickening agent to your individual application upon request.

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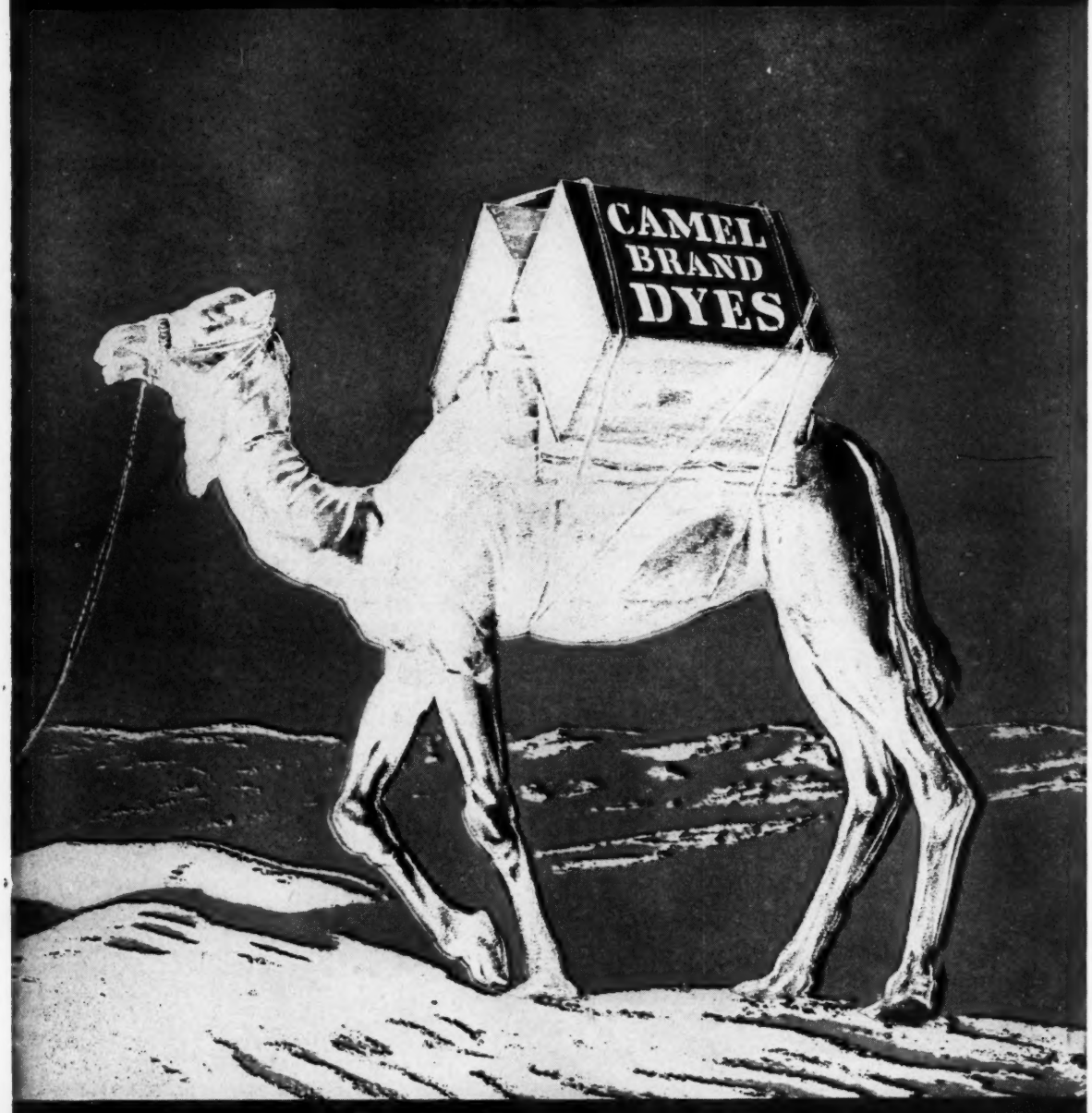
QUALITY DYESTUFFS

SINCE 1878



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NOW... Redder Shades of Black

ON ACETATE RAYON WITH

Hydroxanil "2R"*

Hydroxanil 2R has been developed in answer to popular demand for redder shades of acetate black than those produced through the use of Hydroxanil G. Hydroxanil 2R has all the superior qualities of Hydroxanil G, including, superior wash fastness, resistance to sublimation and perspiration fading.

HYDROXANIL 2R is used in the same manner as Hydroxanil G, and is ideal for producing *wash fast* developed black on acetate and rayon combination materials through the use of acetate developed black and rayon developed black in place of rayon direct black.

With Hydroxanil G and Hydroxanil S, a new member of the Hydroxanil family, a complete line of fast developed colors can be obtained on rayon, cotton and union materials.

HYDROXANIL G (formerly simply Hydroxanil), Hydroxanil 2R, and Hydroxanil S are currently available in commercial quantities and may be used to great advantage not only for their superior qualities but also to replace B.O.N. and Beta Naphthol.

MARCO PRODUCTS

*Patent applied for

Let us solve your developer problems during these days of developer shortages

MAHER COLOR & CHEMICAL CO.

FACTORIES AND LABORATORIES

355 West Ontario Street, Chicago 10, Ill.
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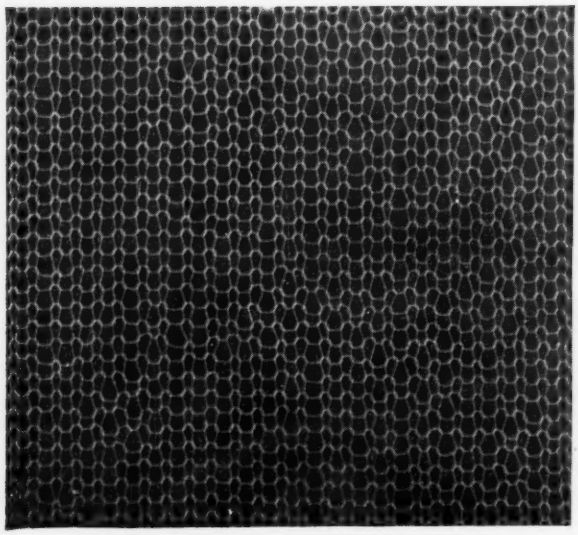
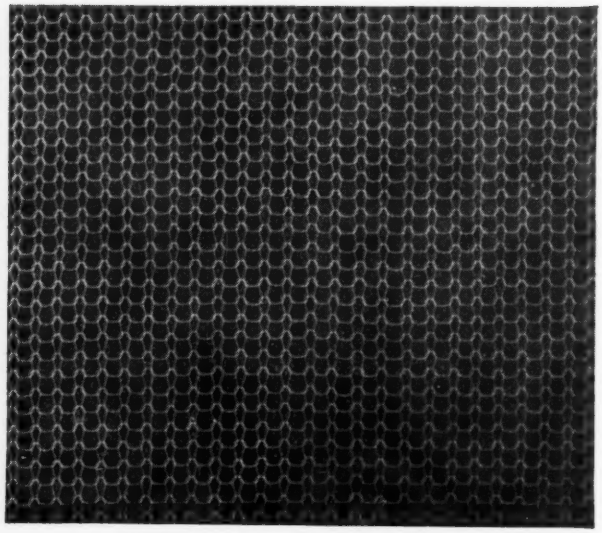
Kōnrite

"TREATS" YARN "RIGHT"!



Here's fabric knit from conventionally treated yarn



Here's fabric knit from KŌNRITE treated yarn

See the Difference?

That's because KŌNRITE treated yarn gives the clear, perfect stitch formation so important in nylon hosiery of the finer grades. This new and unusual coning oil offers many other advantages, as well, that make for greater uniformity in Coning, Knitting and Seaming.

Write today for full information on KŌNRITE

NOPCO CHEMICAL COMPANY, HARRISON, N. J.

Formerly National Oil Products Company

BRANCHES: BOSTON • CEDARTOWN, GA.
CHICAGO • RICHMOND, CALIF.

NOPCO TRADEMARK EVOLVED THRU RESEARCH

KŌNRITE ...

- ▶ **produces cones of proper density. Overlaps, crossovers and underwinds are practically eliminated. Increases cone production besides.**
- ▶ **yields uniform cones. Its controlled viscosity assures even distribution of oil on the yarn.**
- ▶ **minimizes stripping of size in knitting. Reduces press-offs.**
- ▶ **permits rapid cementing of stitches, resulting in a clear and perfect fabric.**
- ▶ **reduces curling. Increases seaming production.**
- ▶ **prevents softening in lagged yarn and fabric.**

Kōnrite — The Outstanding Nylon Coning Oil

Now... plenty available

SANTOMERSE No. 1

for all three functions

penetration

wetting out

scouring

Plant capacity for Santomerse No. 1 has been greatly expanded so that now you can be sure of getting a plentiful supply of this unique, all-purpose detergent and wetting agent that meets requirements for *all three* of these vital functions . . . penetration, wetting out and scouring (cleansing).

In addition, Santomerse No. 1 is:

Stable to acid
Stable to alkali
Stable to hard water
Forms soluble metallic salts
Rinses quickly without insoluble deposit

The table here gives you some of the opportunities Santomerse No. 1 offers for improvements in wool processing. Equally interesting advantages can be gained from the use of Santomerse No. 1 at many points in the processing of cotton, linen, rayon, silk, nylon, jute and hair. For technical details and helpful information, contact your nearest Monsanto office or write for Application Data Bulletin No. P-118. MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Cincinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle. In Canada: Monsanto (Canada) Limited, Montreal.

HOW SANTOMERSE No. 1 IMPROVES WOOL PROCESSES

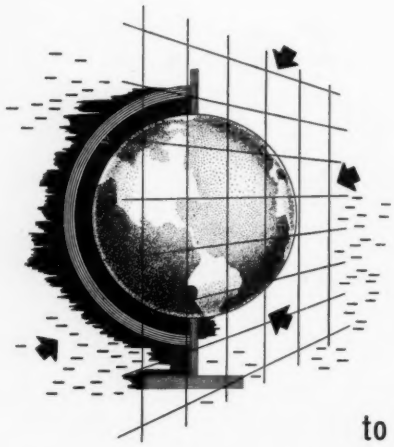
APPLICATION	EFFECT
Raw Stock—	
Carbonizing	Wetting
Dyeing	Wetting, leveling
Neutralization	Assistant in wetting
Scouring	Cleansing
Wetting-out	Wetting
Slubbing—	
Dyeing	Wetting, leveling
Tops—	
Backwashing	Cleaning
Woven and Knit Goods—	
Dyeing	Wetting, leveling
Finishing	Wetting, penetrating
Fulling—acid soap	Wetting, penetrating, lime soap dispersing
Printing	Wetting, penetrating
Felts—	
Dyeing	Wetting, leveling, dispersing
Felting	Wetting, leveling
Scouring	Cleansing

SERVING INDUSTRY... WHICH SERVES MANKIND

MONSANTO CHEMICALS

The neutral character of Santomerse No. 1 makes it especially useful in scouring where it reduces felting and helps prevent injury to the fibre. In a light scour after dyeing, it improves appearance of the fabric and provides a desirable lofty hand. In the fulling operation, it improves penetration and ensures thorough rinsing with freedom from lime and soap curd. Since it is chemically stable, Santomerse No. 1 may be used in either acid or alkaline fulling operations.

Santomerse: Reg. U. S. Pat. Off.



Spin the Globe...

There's a FALLEK Representative Everywhere!

Here is your opportunity to secure World Wide Distribution for American Dyestuffs ...

READ THESE FIGURES!

92% of the world's total exports in Coal-Tar Colors, Dyes and Stains were supplied by Europe to the rest of the world.*

4.6% of the world's total exports in Coal-Tar Colors, Dyes, and Stains were supplied by the United States to the rest of the world.*

With foreign production at a minimum level, now is the opportune time for American Suppliers to secure a solid foothold in the most lucrative overseas markets . . . and here is how FALLEK can help you:

FALLEK . . . eliminates costly credit risks. *You receive your check when your goods are ready for shipment* . . . as simple as a domestic transaction, but larger profits.

FALLEK . . . creates an acceptance for your products throughout world markets that assures continuous business.

FALLEK . . . gains you the proper entree with leading firms of known responsibility.

FALLEK . . . gives you intelligent, daily sales coverage through representatives located in every world market.

FALLEK . . . means permanence, through long established outlets in Europe, Latin America, and the Orient.

FALLEK . . . saves you the detail handling and numerous expenses of operating an export department.

FALLEK . . . brings you men of wide experience, men highly skilled in the problems of world distribution . . . plus skilled technicians in every foreign office fully equipped to render all the technical information necessary to users of American Dyestuffs.

American dyestuffs for textiles, leather, paper, etc., are in urgent demand throughout the world. You can realize a sizeable share of this business by making FALLEK your foreign selling agents. THIS is the time to safeguard profits against the hazards of "buyer's market" or a falling off in domestic demand, by developing a substantial export volume. FALLEK can do this for you.

**U. S. Tariff Commission Report No. 19 last pre-war figures 1946*

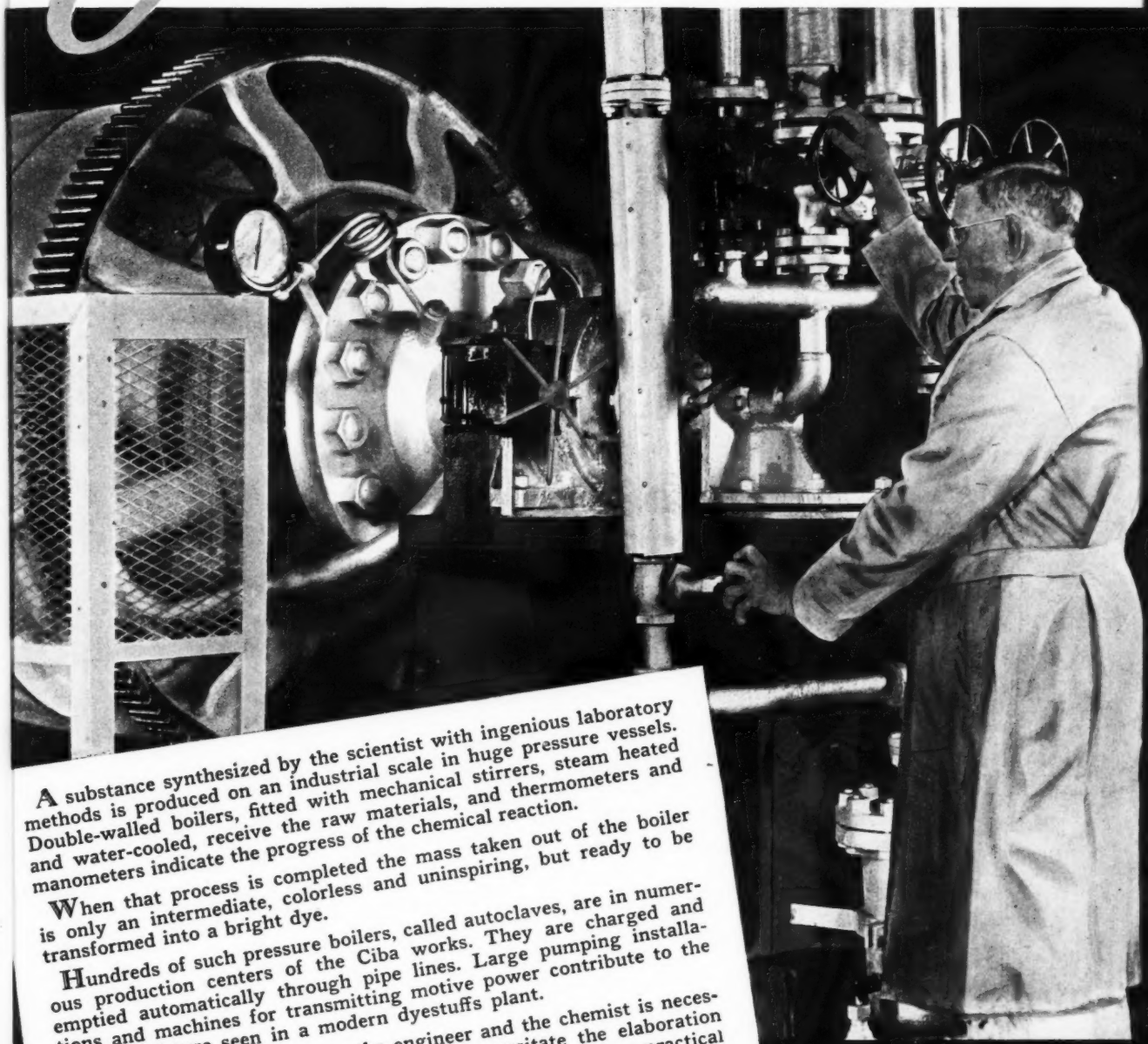
WRITE, WIRE OR PHONE FOR FURTHER INFORMATION.

FALLEK PRODUCTS COMPANY, INC.

165 BROADWAY • NEW YORK 6, N. Y.

SPECIALISTS IN ORGANIC CHEMICALS

Ciba DYESTUFF GLIMPSES



A substance synthesized by the scientist with ingenious laboratory methods is produced on an industrial scale in huge pressure vessels. Double-walled boilers, fitted with mechanical stirrers, steam heated and water-cooled, receive the raw materials, and thermometers and manometers indicate the progress of the chemical reaction.

When that process is completed the mass taken out of the boiler is only an intermediate, colorless and uninspiring, but ready to be transformed into a bright dye.

Hundreds of such pressure boilers, called autoclaves, are in numerous production centers of the Ciba works. They are charged and emptied automatically through pipe lines. Large pumping installations and machines for transmitting motive power contribute to the complex picture seen in a modern dyestuffs plant.

Close collaboration between the engineer and the chemist is necessary, as chemical discoveries frequently necessitate the elaboration of absolutely new techniques before they can be utilized in a practical manner. Consequently, new methods of production have to be devised from time to time in the dyestuffs factory and obsolete methods discarded. There is hardly an industrial enterprise so incessantly in a stage of development as a large chemical concern.

DYESTUFFS • CHEMICALS • INTERMEDIATES

CIBA COMPANY, INC.

Greenwich & Morton Sts.
NEW YORK

BOSTON · CHICAGO · MONTREAL · CHARLOTTE
PROVIDENCE · SAN FRANCISCO · PHILADELPHIA

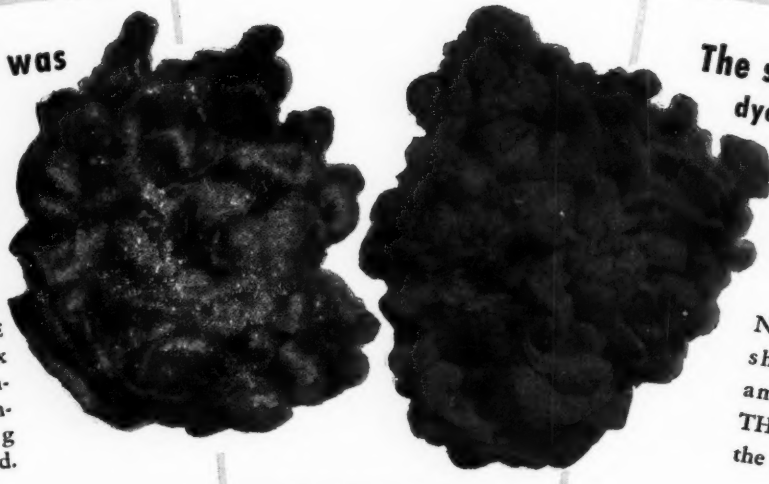
VAT DYES OF THE DOW CHEMICAL COMPANY

A COMPLETE RANGE OF FAST-TO-LIGHT DYES BEFORE AND AFTER UREA-FORMALDEHYDE RESIN TREATMENT.

TIPPY WOOL ?

This wool was dyed in the ordinary way

An ACID BLUE (Color Index No. 208) considered an uneven dyeing color, was used.



The same wool— dyed with the same color, but with the aid of ANTHOMINE

Note the uniform shade. A small amount of ANTHOMINE made the difference.

TRY ANTHOMINE !

(PATENT APPLIED FOR)

TO ELIMINATE UNEVEN DYEINGS

. . . QUICKER AND BETTER EXHAUSTION OF THE DYEBATH

. . . A SOFTER, MORE PLEASING "HAND"

. . . SUBSTANTIAL INCREASE IN COLOR YIELD

. . . NO SACRIFICE OF BRIGHTNESS OR FASTNESS

. . . PROCESSING TIME REDUCED

Although it has only recently been released for general sale, ANTHOMINE has been used and tested by many mills for more than a year. Colors and wool with tendencies toward uneven and tippy dyeing were especially selected for testing.

The results of actual mill use of ANTHOMINE in dyeing stock, yarn, or piece goods confirmed the hundreds of tests made in our laboratories.

Thus, ANTHOMINE is now offered to the trade as a tried and tested solution to the tippy wool dyeing problem with an assurance born of complete success in dyehouse.

Write for Technical Service Bulletin No. 203.100.1

Arkansas Co. INC.

Manufacturers of Industrial Chemicals for Over 40 Years

NEWARK, NEW JERSEY

UNITED STATES RUBBER COMPANY

SERVING THROUGH SCIENCE

Cottons are crisper . . .
Rayons gain in hand

with the new, easy-to-apply

Kandar*

Permanent Finish

Every fabric becomes richer . . . every print takes on new sharpness and clarity . . . every cotton or rayon improves in hand and in other apparent qualities when permanently finished with Kandar.

Kandar brings permanent crispness and fullness to cottons and rayons without changing their fundamental texture. It does not call for additional equipment—needs no curing. It is readily compatible with other fabric finishes.

Kandar vastly improves sheetings, shirtings, towelings, and wash cottons . . . keeps the linting down . . . corrects the fuzziness in spun rayons. We welcome inquiry from weavers, dyers, finishers and cutters. Samples and technical cooperation in your mill without charge or obligation. Write to

NAUGATUCK CHEMICAL

Division of United States Rubber Company

NAUGATUCK, CONNECTICUT

BRANCHES: AKRON • BOSTON • DETROIT • LOS ANGELES • PHILADELPHIA • NEW YORK

*Reg. U. S. Pat. Off.

For Uniform Results In Textile Wet Processing . . . Use Hooker Chemicals

Whatever the textiles with which you are working —cottons, woolens or synthetics—there are Hooker Chemicals that will make your work easier, and help you maintain high standards of quality.

That's because Hooker, too, maintains high standards of purity and uniformity in the chemicals it manufactures. Your bleaching, dyeing and finishing processes can be smooth and trouble-free, and your results consistently uniform when you use Hooker Chemicals.

Continued improvements in manufacturing processes and equipment, careful supervision and control, strictly maintained specifications of purity are tenets of Hooker operations. All these combine to bring you chemicals that make standardizing of your operations practical.

Some of the Hooker Dyestuff and Textile Chemicals and the principal Hooker specifications are listed below. More complete information and samples will be furnished when requested on your business letterhead.

Hooker Products List, Bulletin 100, contains chemical and physical characteristics, uses and shipping information on nearly 100 Hooker Chemicals, many of them for the textile and dye industries. Send for a copy.

PRODUCT *Chemical Formula; Molecular Weight*	HOOKER SPECIFICATIONS	SUGGESTED USES
Antimony Trichloride Anhydrous $SbCl_3$; 288.1	Antimony Trichloride..... 99% Min. Iron and Arsenic..... 1% Max. Lead..... 0%	Catalyst in organic synthesis; mordant in textile printing. Moisture and fireproofing textiles.
Benzal Chloride $C_6H_5CHCl_2$; 161.0	Clear, yellow liquid. Boiling Range..... 200 to 235°C Specific Gravity 15.5°/15.5°C..... 1.279 ± .005	Dyestuff intermediate.
Chloranisidine $NH_2C_6H_3ClOCH_3$; 157.5	Gray crystalline solid. Melting Point..... 79°C Min. Diazo Test..... Relatively clear.	Dyestuff intermediate.
Lauryl Pyridinium Chloride C_5H_5N ($C_{12.6}H_{26.2}$)Cl; 292.0	Mottled tan, semi-solid. Solubility in water is 60 gms. per 100 gms. of water. Alkyl Pyridinium Chloride (Calc. as C_{12}) ..... 85.0% Min.	Cationic detergent. Wetting and cleaning agent for textile fibers. As a leveling agent and color modifier in dyeing.
Monochlorbenzene C_6H_5Cl; 112.5	Clear, colorless liquid. Distillation Range..... 131.3 to 132.3°C	Dyestuff intermediate, preparation of sulfur black, brown dyes. Solvent.
Orthodichlorbenzene, Tech. $C_6H_4Cl_2$; 147	Clear, colorless liquid. Freezing Point..... −10° to −22°C Boiling Range..... 6° including 179°C	Manufacture of pyrocatechin, dye intermediates, other synthetic organic chemicals. Degreasing wool.
Phosgene (Carbonyl Chloride) $COCl_2$; 98.9	Colorless gas at ordinary temperatures. Does not discolor a 0.2% solution of KI when vigorously bubbled through it for one half hour. (Test for free chlorine)	Dye intermediate; chlorinating agent.
Sodium Sulfhydrate NaSH; 56.1	NaSH..... 70 to 72% Na_2S..... 0.25 to 2.5% Fe..... 5 ppm Max. NaCl..... 0.4 to 0.8% Na_2SO_3, $NaHCO_3$..... 0.04 to 0.4% Cu, Ni, Cr, Mn, Pb..... 1 ppm Max. Water of crystallization..... 28 to 26%	Desulfurizing rayon; calico printing; in sulfur dye baths.
Sodium Sulfide Na_2S; 78.1	Na_2S..... 60 to 62% Fe..... 8 ppm Max. NaCl..... 1.5% Max. Other Na Salts..... 2.0% Max. Cu, Ni, Cr, Mn, Pb..... 1 ppm Max. Water of crystallization..... 36.5 to 34.5%	Desulfurizing rayon; calico printing; in sulfur dye baths.

HOOKER ELECTROCHEMICAL COMPANY

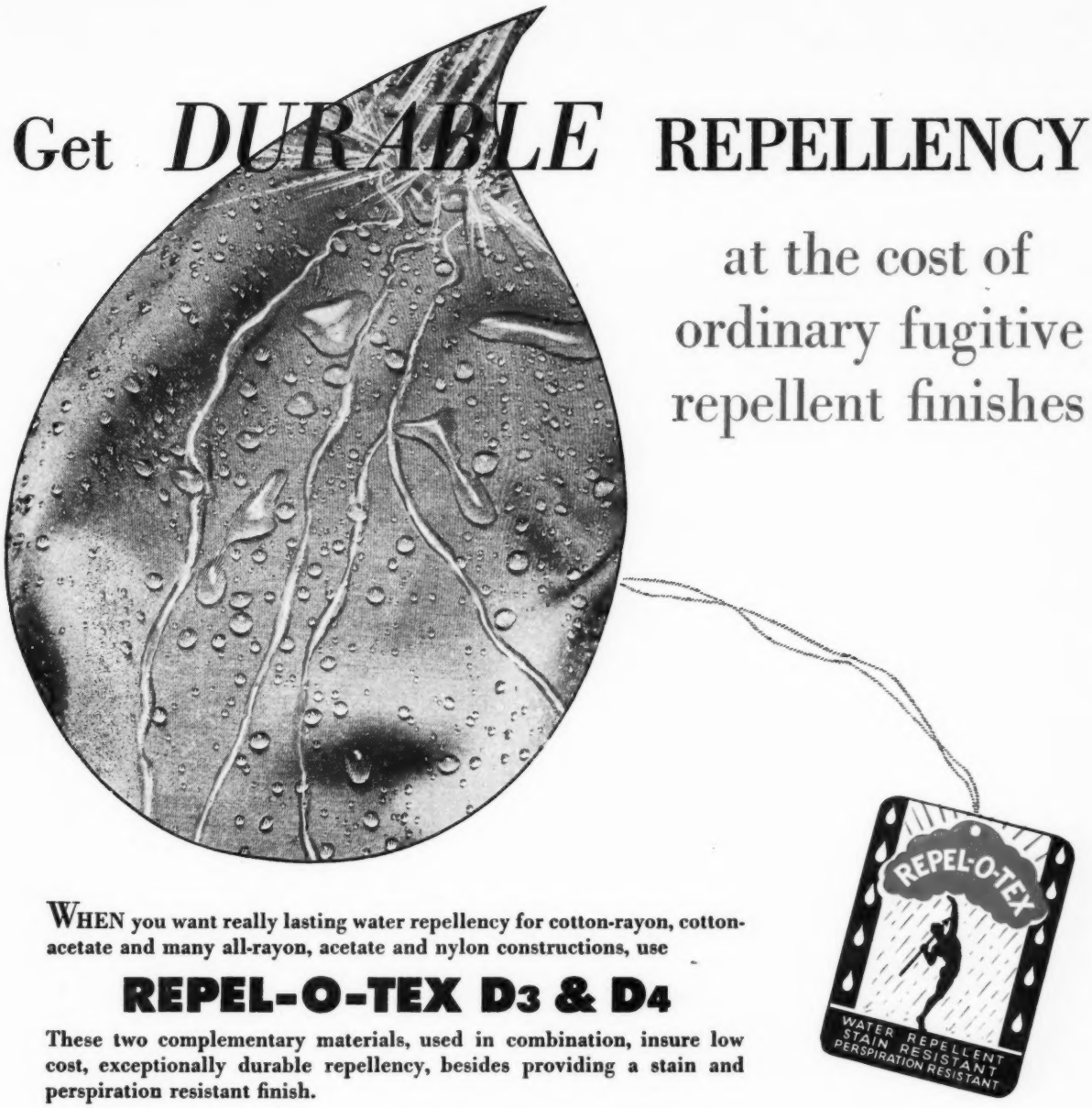
HOOKER CHEMICALS

2 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
New York, N. Y. Wilmington, Calif. Tacoma, Wash.

Caustic Soda **Chlorine** **Muriatic Acid** **Paradichlorbenzene** 2424

Get *DURABLE* REPELLENCY

at the cost of ordinary fugitive repellent finishes



WHEN you want really lasting water repellency for cotton-rayon, cotton-acetate and many all-rayon, acetate and nylon constructions, use

REPEL-O-TEX D3 & D4

These two complementary materials, used in combination, insure low cost, exceptionally durable repellency, besides providing a stain and perspiration resistant finish.

Easy to apply in the jig, pad or quetsch. No scouring or curing is needed.

Any desired hand or finish may be obtained by suitably varying the proportions of Repel-O-Tex D3 and D4 used for the treatment.

A Trial Run Will Convince You!

ONYX OIL & CHEMICAL COMPANY

JERSEY CITY 2, N. J.

CHICAGO • PROVIDENCE • CHARLOTTE • ATLANTA • LOS ANGELES

In Canada: Onyx Oil & Chemical Co., Ltd., Montreal, Toronto, St. Johns, Que.

For Export: Onyx International, Jersey City 2, N. J.

onyx **CHEMICALS FOR DYEING AND FINISHING**

MAYPON The Improved Lamepon • MAYPON The Improved Lamepon

for wetting and dispersing purposes . . .

USE . . .

MAYPON

(THE IMPROVED LAMEPON)

PROTEIN — FATTY ACID — CONDENSATION PRODUCT

produced ONLY by

MAYWOOD CHEMICAL WORKS

MAYWOOD, N. J.

MAYPON The Improved Lamepon • MAYPON The Improved Lamepon

TESTED AND APPROVED

VELVAMINE K-90
PERMALENE SOL
VELVAMINE GF
PERMALENE WS

PERMALENE SOL

A penetrant and cleanser designed for use on all fabrics especially those that are tightly woven and highly twisted. Recommended for pad-dyeing where it insures uniform and thorough penetration. It is of great assistance where low temperature dyeings are necessary. Non-foaming at high speeds, it is stable in neutral, alkaline and acid solutions.

VELVAMINE GF

Velvamine GF is a blend of amines and softeners designed to protect acetate colors from gas or fume fading. It resists removal by drycleaning and, when used on mixed fabrics, has a minimum effect on the shade and light fastness of the direct colors. Velvamine GF produces a soft, full hand and does not affect the appearance of the treated fabrics.

VELVAMINE K-90

An improved softening and finishing agent for use on all types of fabrics. It imparts an odorless finish which is resistant to washing and dry cleaning. Can be used as a substitute for sulphonated oils, tallows and other softeners. Its use eliminates yellowing and rancidity often encountered with the usual fatty type of softening agents.

PERMALENE WS

A white powder soluble in water at 80° F. Capable of dispersing iron, calcium and magnesium salts and redissolving or redispersing precipitated compounds of these metals. It is so highly buffered that the pH of its solution is practically independent of its concentration.

REFINED PRODUCTS CORPORATION

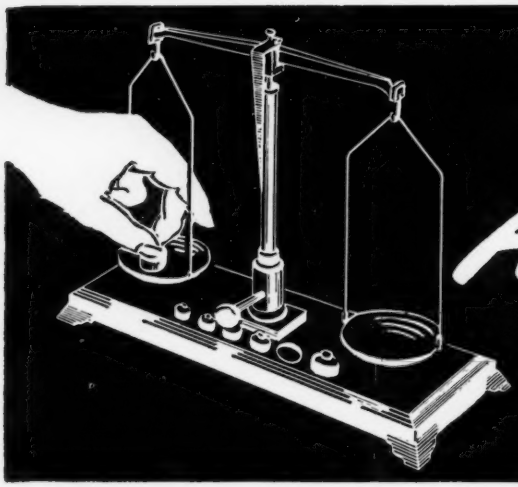
***Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent**

Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I.
CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Carbic Color and Chemical Co., Inc., 56 McNab Street South, Hamilton, Ontario

Exporting Agent: Chem-Col Company, 82 Wall St., New York City.



You've Got to Measure

ACCURATELY

to Get the Best Results!

For Accurate Salt Measurement

"PASS the SALT" BY LIXATOR

EVERY DYER knows that salt is a top-flight exhausting agent ... that it must be accurately measured to insure complete exhausting without waste ... and further that it must also be uniformly distributed in the dye bath to prevent spotting, streaking and white edges. The question is *how.*

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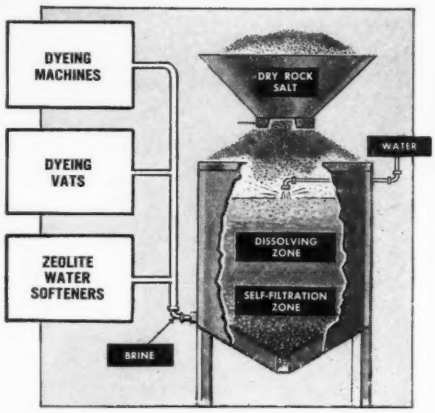

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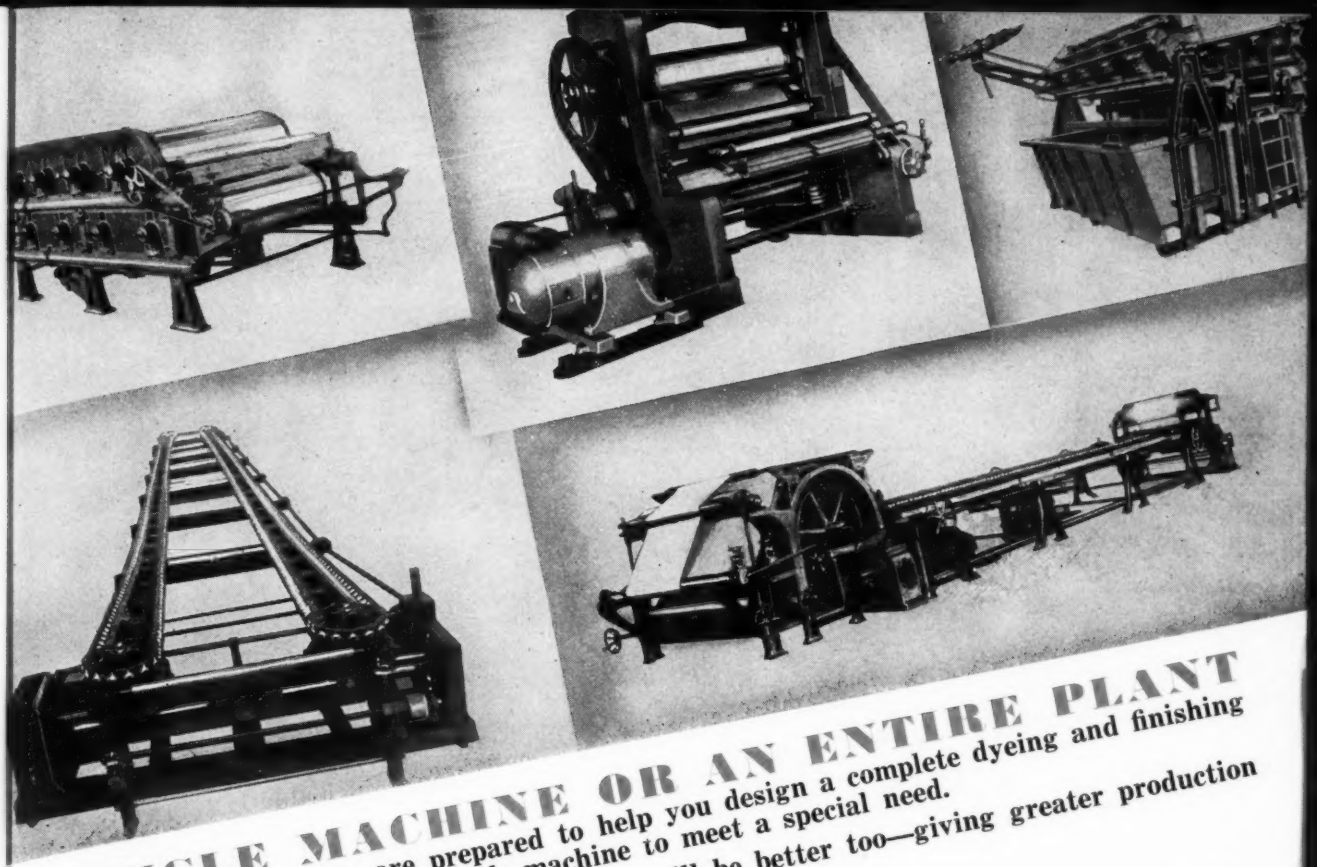

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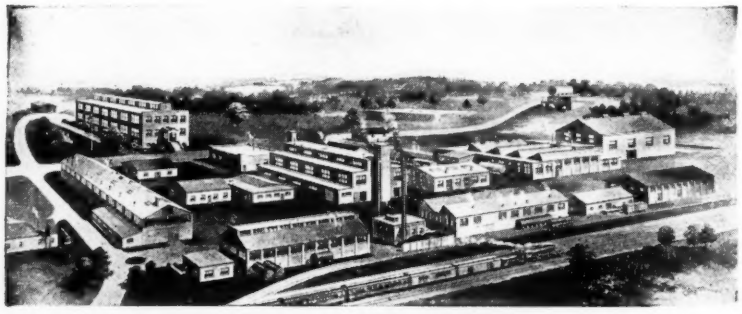

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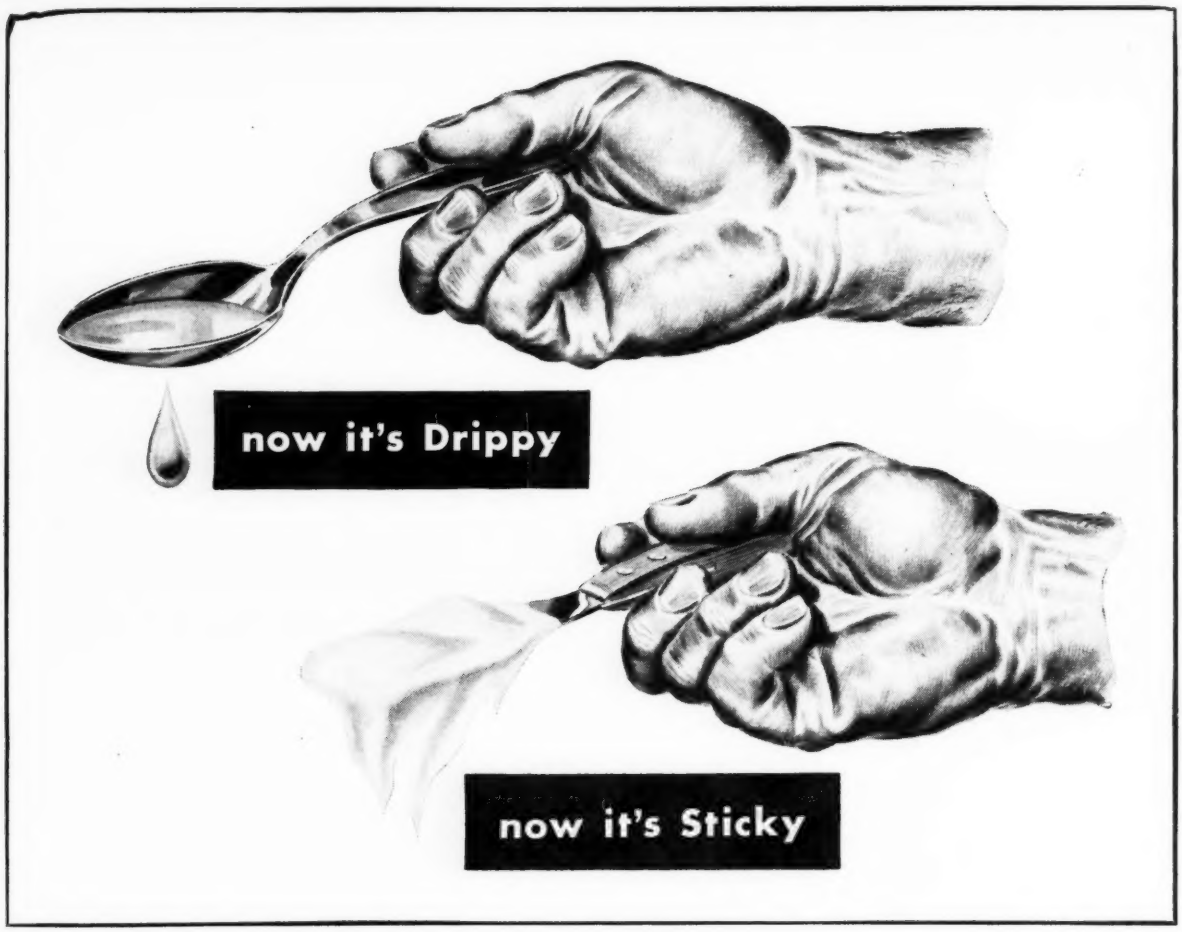

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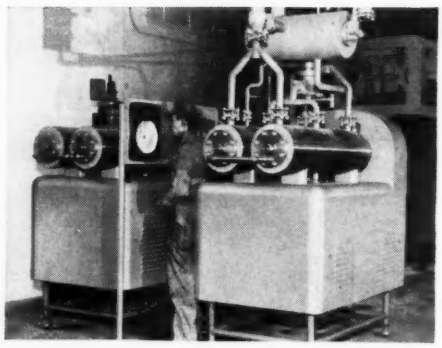

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VOLUME 36 NOVEMBER 3, 1947 NUMBER 22

Construction and Operation of Accelerated Aging Cabinets

DOROTHY SIEGERT LYLE

Ellen H. Richards Institute,
The Pennsylvania State College

VARIOUS methods and techniques have been proposed and developed in the past few years with the view of contributing toward the development of accelerated aging tests for textile fabrics. Particularly has an accelerated light test been of interest.

To combine light with other agencies, or even to measure the effect of light exposure alone with accuracy, textile fabrics must be exposed under controlled conditions. An approach to this was made by Appel and Jessup *(1)*, who built two cabinets 17 x 14½ x 15 inches, in which fabrics could be housed while being exposed to the Fade-Ometer through the glass faces. A small thermostat, and small dishes in which solutions of different salts were provided, made some contribution toward establishing constant temperature and humidity conditions. These cabinets were turned over to the Ellen H. Richards Institute by W. D. Appel of the National Bureau of Standards, and were used by Chapman *(2)* in her investigation of accelerated light testing.

This paper describes the construction and operation of accelerated aging cabinets in which textile and other fabrics can be exposed to the radiations of a Fade-Ometer, with all factors under satisfactory control. The equipment also provides the means of combining light exposure of fabrics with exposure to other agencies. For example, fabrics may be exposed at different temperatures and humidities and in atmospheres of different gases; and fabrics may be alternately exposed to light and saturated with perspiration, exposed to light and laundered or dry-cleaned, or exposed to light and abraded.

The exposure cabinets present a further advantage in that a sufficiently large specimen of fabric is used to permit observations on strength, shrinkage, and color change to be made following one exposure treatment.

Construction of Accelerated Aging Cabinets

Figure 1 shows a labeled diagram of the construction details of the apparatus. Figure 2 gives the placement of the cabinets in relation to the Fade-Ometer. Figures 3, 4, and 5 show respectively: the aging cabinet and its connection with oxygen and water lines; a side view of the aging cabinet showing control panel; and the interior view of the cabinet.

The cabinets were built of three-quarter inch ply wood with a cover grooved to fit tightly. The windows, measuring 6 x 3¾ x 6 inches, were made of double panes of heat-resisting clear chemical glass, Corning Number H.R. 744 *(3)*. Transmission is over 80.0 per cent down to 320 millimicrons, followed by a rapid drop with low transmission at 280 millicrons. In the visible region, little absorption is encountered, and any losses are essentially those resulting from reflection. The net transmission between 400 to 750 millimicrons generally is above 90.0 per cent in this glass.

Figure 6 shows the general transmission behavior of this glass.

The temperature was held constant by a biometallic thermo-regulator, 175 watts per contact. Heat was supplied by a specially built bare wire heating element, 150 watts, placed at the rear of the cabinet. For low temperatures, cold tap water was passed through a copper cooling coil made of copper tubing with a standard wall thickness of 0.035 inch, placed directly in front of the heating element.

In the experimental development of the aging cabinets, different humidities first were obtained by placing saturated salt solutions in a glass tray directly in front of the heating element and underneath the cooling coils, so that any moisture which might condense on the coils would fall back into the glass tray. The use of salts as a means of obtaining the relative humidity desired in the aging cabinets was unsatisfactory because of the following facts:

a. The dissociation of the salts in themselves was found to have the potentiality of causing changes of color or strength in the fabrics.

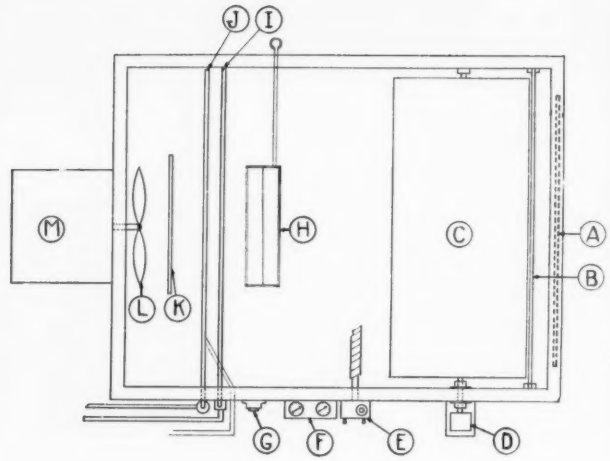
b. The creeping of the salts presented a problem which militated against maintaining the proper exposure conditions during a run.

c. It was necessary to interrupt the conditions of a run in order to replenish the salt solutions.

d. Actual damage to the electrical wiring of the equipment occurred because of the creeping and volatilization of the salts.

Better control of humidity was effectuated by building within each exposure cabinet a copper trough measuring seven inches in length, two inches in width, and two inches in depth. Attached to the trough a metal rack measuring 5 x 7 inches was constructed. On the latter was hung a knitted cotton wick. Moisture was admitted from the outside of the cabinet by means of filling a trough on the outside of the cabinet, which communicated by means of a copper tube with the inside trough supporting the wick.

Directly in front of the cooling coils and one inch from the lower edge of the coil, a copper tube of the same type used in the water coil was pierced with three minute holes. One hole was placed in the center and one on each end of the line. These permitted the introduction of oxygen from the supply line. Other gases might also be introduced. The oxygen tank was fitted with a constant pressure



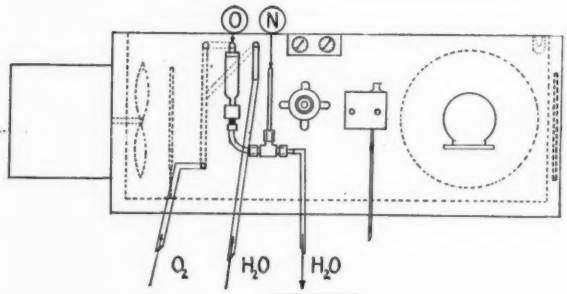


Figure 1
Structural Diagram of Top and Side View of Aging Cabinet

Key

A. Chemical glass, Brand No. H.R. 744.
B. Brass sample rod with one-fourth inch riveted pins spaced three-fourth inches apart.
C. A cork covered drum, 16 inches long, 8½ inches in diameter.
D. Geared shaft driven by an induction type motor, 110 V., A.C., 60 cycles.
E. Bi-metallic thermo-regulator, 175 watts per contact.
F. Weston wet and dry bulb thermometers.
G. Fuse.
H. Trough, rack and wick to supply humidity.
I. Oxygen supply line.
J. Copper cooling coil.
K. Bare wire heating element, 150 watts.
L. Two-blade metal fan.
M. Electric motor, 11 V., 2.4 amp., ⅛ H.P., 60 cycles, R.P.M. 1725.
N. Air inlet tube.
O. Water manometer.

regulator for an oxygen cylinder. Two valves permitted the flow of oxygen through the individual calibrated flowmeters and into each box. Each cabinet was flushed with 10 cubic feet of oxygen and the flow then was regulated at the desired number of liters of gas per hour. Pressure at the tank was held at 10 pounds.

The fan and heating element were connected in series with a motor, 115 volts; 2.4 amp; ⅛ H.P.; 60 cycles: P.H. 1: R.P.M. 1725: Temperature Rise 40° F. The fan placed in the rear of the box and back of the heating element facilitated good circulation.

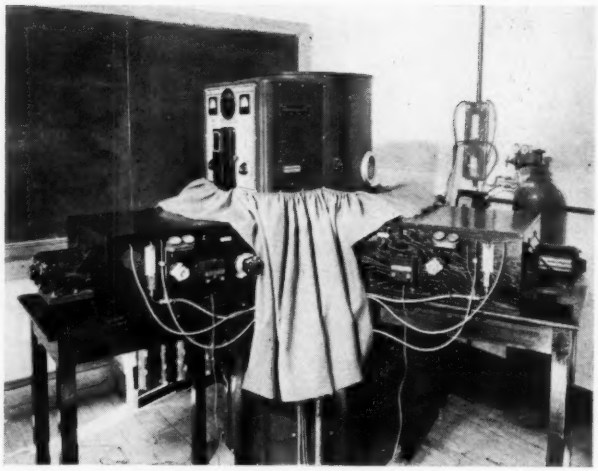


Figure 2
Placement of Aging Cabinets in Relation to FDAR Fade-Ometer.

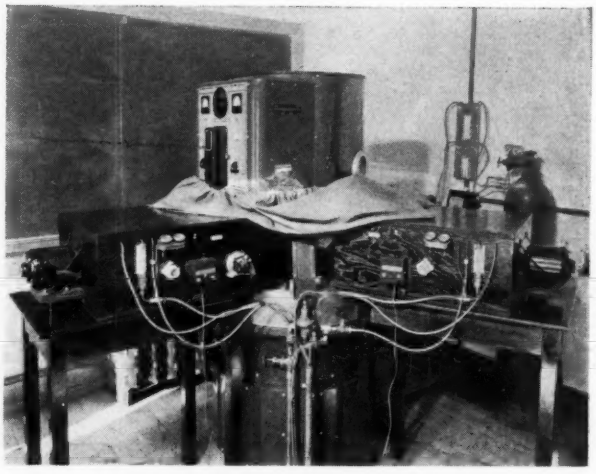


Figure 3
Aging Cabinet Showing Connections to Water and Oxygen Lines.

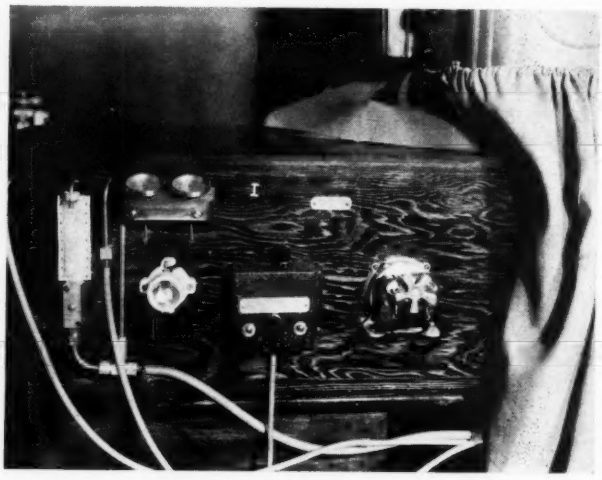


Figure 4
Side View of Aging Cabinet Showing Control Panel.

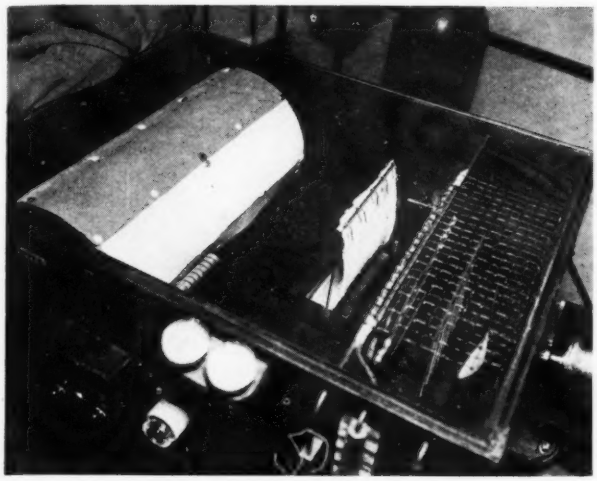


Figure 5
Interior View of Aging Cabinet.

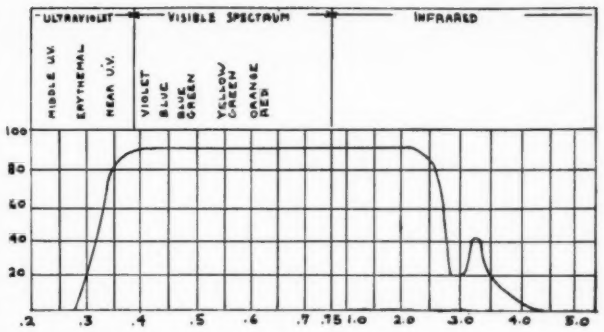


Figure 6
Spectograph Showing Transmission Behavior of Chemical Clear Glass 774.

Two metal Weston Thermometers were inserted in front of the heating and cooling elements. The wet bulb thermometer was inserted into a small copper cup which could be filled conveniently with distilled water from the outside of the box. Wet and dry bulb readings were recorded and the percentage relative humidity determined from psychrometric tables and charts.

For direct exposure to the light of the Fade-Ometer, a brass rod with one-fourth inch riveted pins spaced three-fourths of an inch apart, to facilitate the ease of placing and removing samples, is located directly behind the double window. In order to accommodate a larger number of test specimens, and further to dispose one test specimen across the exposure area so as to equalize differences in position with reference to the light sources, a cork-covered drum measuring 16 inches in length and eight and one-half inches in diameter was introduced. It is rotated by a geared shaft driven by an Induction Type Motor, 110 V. A. C. cycles, geared down to one-half revolution per minute. Samples are conveniently thumb-tacked to the drum.

Position of Samples with Respect to Fade-Ometer

It is a recognized fact that the operation of individual Fade-Ometers has not, as yet, been standardized satisfactorily. The intensity of the light generated by the carbon arc may fluctuate from time to time, because of variations in the line voltage, and because of shifting of position of the hot spot at the end of the carbons. The Lightfastness Committee of the American Association of Textile Chemists and Colorists has recommended revolving the fabric around the light source so as to equalize exposure positions, and has provided a means of calibrating an instrument in terms of the performance of a *standard lamp* housed at the National Bureau of Standards. This gives an over-all estimation of the performance of the Fade-Ometer.

With the use of cabinets in standard positions, however, the revolving specimen rack for direct exposure no longer is applicable. In short, the introduction of a cabinet which provides controlled conditions and permits the use of a test specimen sufficiently large for numerous measurements, introduces an error in the fact different parts of the test specimen are at different distances from the light source. This same error likewise pertains in direct exposure of fabrics in a Fade-Ometer in cases in which specimens sufficiently large for different measurements are used; since the intensity of radiation decreases with the square of the distance from the light source.

The provision of a cylindrical roll on which several test fabrics are mounted with the narrow dimension in the direction of rotation of the roll, and the long dimension across the roll, was considered as a possible method of reducing the error of the method: (1) by enabling the specimen to move through the radiations rather than to remain stationary; and (2) by providing a large test specimen from which careful, uniform routine sampling for strength, color-fastness, or other factors will enable measurements in standard positions of the test fabric to provide a satisfactory average result.

Standardization of Fabric Position

In order to obtain objective measurements of light intensity in different positions inside and outside of the two respective cabinets, a routine calibration technique was followed. This was not only desirable in order to find the radiation intensity at different positions on the roll on which the test specimens are exposed, but also because the two cabinets are in a stationary position, the one facing the arc direct, and the other from the side. The following calibration procedure was undertaken, using the FDAR Fade-Ometer throughout:

(1) A thermopile was placed in the center, four and one-half inches from the left and again the same distance from the right side of each cabinet, respectively. The resistance in the galvanometer-thermopile circuit was adjusted to yield a full-scale galvanometer deflection for the maximum intensity measured. This resistance remained unchanged throughout the measurements so that the deflection of the galvanometer may be taken as a measure of the radiation intensity at the thermopile.

Readings were recorded every one-half minute for one-half hour periods in each of the three positions. Two sets of readings were taken in the above mentioned positions, the first set with new carbons and a clean globe, the second set after the arc had been burning for at least four hours. A third set of readings were made with the thermopile placed on the table outside of the cabinets and in the same relative positions as those made inside of the cabinets.

(2) *Calibration Paper B* was placed on rods and hung inside of the face of the window of each cabinet for 30 hours, while the cabinet temperature was maintained at 105° ± 1° F. The paper was marked off in blocks measuring 3¼ x 3 inches, as shown in Figure 7.

Reflectancy readings in each area were made on the Hunter

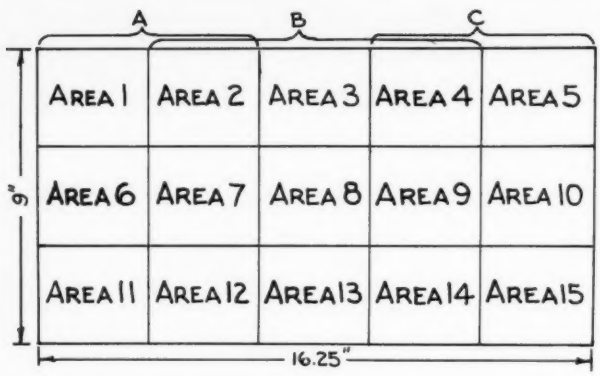


Figure 7
Areas on Calibration Paper B in Which Color Difference Units Were Determined with the Paper Hung Within the Box Directly Behind the 744 Glass.

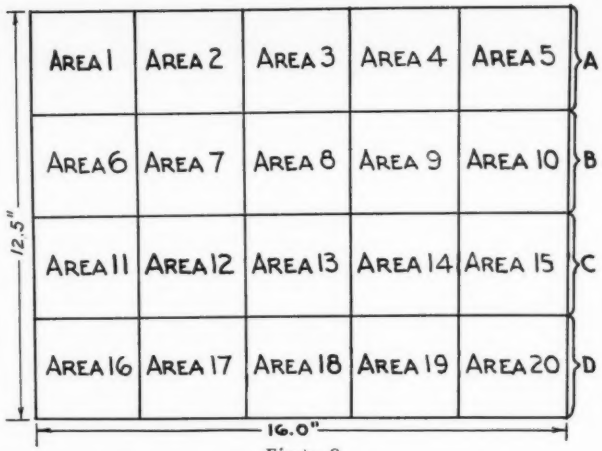


Figure 8
Areas for Evaluating Units of Color Difference Marked on Calibration Paper B and a Textile Fabric, Each Covering One-Half of the Drum with the Line of Division Parallel to the Axis of Rotation.

Reflectometer before and after exposure. The color difference of each area was calculated by Judd's color difference formula (5).

At the same time at which the exposure was made at the inside surface of the cabinet windows, the *Calibration Paper B* was hung in racks in the Fade-Ometer at relatively the same height as that hanging within the glass windows, but on the opposite side of the Fade-Ometer. Specimens thus exposed in the Fade-Ometer directly to the light were removed at five-hour intervals. From the color difference obtained during five hours of direct exposure to the Fade-Ometer, a calibration curve was made in order to determine the ratio of direct exposure to the light to that of the samples exposed within the cabinets.

(3) Following the above procedure, *Calibration Paper B* and a light blue spun viscose rayon fabric were placed on the revolving drums for 120 hours, while the cabinet temperature was maintained at 105° ± 1° F. Each specimen *(Calibration Paper B* and fabric) covered one-half of the drum, with the line of division parallel to the axis of rotation. The areas drawn on the calibration paper and fabric, respectively, for the purpose of comparing units of color difference for 60 hours per fabric are shown in Figure 8.

At the same time, the calibration paper and the fabric were mounted on cardboard and exposed directly in the Fade-Ometer.

(4) A subsequent exposure treatment under the same conditions, but for a running time of 160 hours was made on a cellulose acetate rayon dyed with 1.0 per cent Celanthrene Blue F.F.S. Later, a green basket weave fabric of mercerized cotton was exposed in Cabinet I and a rose spun fabric of Aralac and viscose rayon in Cabinet II. As with the other textile fabrics, these also were mounted on cardboard and exposed directly in the Fade-Ometer.

Presentation of Calibration Data

A summary of the galvanometer measurements obtained upon exposure of a thermopile inside and outside of the aging cabinets is given in Table I.

Table II shows the average units of color difference of the calibration paper and of the fabrics used in this study under the various conditions of test in the aging cabinets as specified. Table III and Figure 9 embodies the same information for the calibration paper and the fabrics when they were exposed direct in the Fade-Ometer.

From these tables and this figure, a comparison of the different exposure areas within the cabinet could be made, and the results obtained within the cabinet could be compared with those hung directly in the Fade-Ometer.

Discussion of Findings

Comparison of Radiation Intensities Inside and Outside of the Cabinets, Using a Thermopile

Although the thermopile showed the light source to fluctuate considerably over a one-half hour period, as indicated by the standard deviation of the readings within each various position, the color change which occurred in the fabrics indicates that the average radiations from the source caused an over-all fading which was of

TABLE I

Summary of Galvanometer Measurements Upon Exposure of Thermopile in Aging Cabinet and on Table Direct to Carbon Arc Light of F.D.A.R. Fade-Ometer

(Arbitrary Deflection Units Proportional to Total Radiated Energy)

	Cabinet I			*Cabinet II*		
	Left Side	*Center*	*Right Side*	*Left Side*	*Center*	*Right Side*
New Carbons						
Highest	13	24	12	15	25	12
Lowest	5	8	5	5	8	4
Average	8.7	14.3	7.1	9.1	18.1	7.3
Standard Deviation	2.4	4.2	4.0	2.6	4.5	2.4
Per Cent Variation	91.9	111.9	98.6	109.9	93.3	109.6
After 4 hours operation						
Highest	16	34	9	20	46	15
Lowest	5	11	4	6	12	5
Average	9.2	22.4	6.2	12.2	23.8	9.2
Standard Deviation	3.0	6.5	1.5	3.2	7.5	3.2
Per Cent Variation	119.6	102.7	80.6	115.2	142.8	108.7
Exposure Direct toLamp						
Highest	27	40	19	33	36	16
Lowest	17	22	11	17	12	10
Average	21.7	29.3	15.1	23.5	22.3	12.8
Per Cent Variation	46.1	61.4	52.9	68.0	62.7	46.8

the same order of magnitude as the respective areas of the same test specimen.

The light transmitted into the cabinet was of greatest intensity at the mid-position, decreasing toward the edge of the window in each case. The least amount of light transmitted was on the right side of Cabinet I. This was due to the fact that the iron rods which support the globe of the lamp cast their shadows upon the exposed specimen.

While there appeared to be considerable variation within each cabinet, statistically there was no significant difference between operations of Cabinet I and Cabinet II, when new carbons were used in the Fade-Ometer. After the arc had burned for a period of four hours, however, there was a slightly significant difference between the results in Cabinets I and II.

Results of Exposure of Calibration Paper B Hung on Rod Directly Back of Glass Window of Cabinet With that on Direct Exposure in Fade-Ometer

The fact that there are double glass windows in the cabinets and the further fact that the distance of the samples in the cabinets from the center of the carbon arc is greater than that of the samples hung directly in the Fade-Ometer combined to reduce the degree of fading in the aging cabinets to one-half in the mid-position, as compared with direct exposure. The exposure of the samples in the cabinet and placed on the rods for 30 hours was equivalent approximately to 15 hours of direct exposure to the carbon arc light of the Fade-Ometer.

Variations existed in the degree of fading in the center area of the cabinet and in each side area; the center area showed the greatest degree of fading.

The sensitive colored calibration paper (Calibration Paper B) showed a larger color difference than did the particular fabrics used in the study.

The average variation between the two cabinets was negligible when *color difference* was considered as the criterion of measurement. This is consistent with the thermopile results. Variation within each cabinet was great when small areas were considered; the variation was as high as 40.0 per cent between the areas showing the lowest and highest color difference. Considering the area used in a test specimen, variation was reduced to 16.7 per cent for Cabinet I; 11.7 per cent for Cabinet II. These variations using fabrics hung directly inside of the cabinet windows still are too high, and hence a means of reducing this further, while allowing even larger specimens for testing purposes, led to the introduction of a revolving drum within the cabinets, as a substitute.

TABLE II

Average Units of Color Difference of Samples Exposed in the Aging Cabinets

Condition of Test	*Areas*																			
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
Calibration Paper B, Hung on Rod of Cabinet I, 105 ± 1° F. 30 Hours	8.0	8.7	9.6	8.3	7.6	8.7	11.3	13.5	11.3	10.1	7.6	11.3	12.2	12.7	10.9	x	x	x	x	x
Calibration Paper B, Hung on Rod of Cabinet II, 105 ± 1° F. 30 Hours	9.5	11.3	10.4	8.7	8.4	9.6	12.7	13.0	10.9	8.8	8.3	10.1	10.4	10.9	10.2	x	x	x	x	x
Calibration Paper B, Placed on Drum of Cabinet I, 105 ± 1° F. 120 Hours	7.9	7.9	9.6	8.7	6.7	7.9	8.3	9.1	9.1	5.6	7.4	7.9	8.7	8.3	6.2	7.4	9.1	6.6	7.4	5.9
Calibration Paper B, Placed on Drum of Cabinet II, 105 ± 1° F. 120 Hours	8.1	6.7	7.9	5.8	4.3	6.2	7.9	8.7	7.1	4.7	x	x	x	x	x	x	x	x	x	x
Blue Viscose Rayon Fabric Placed on Drum of Cabinet II, 105 ± 1° F. 120 Hours	0.5	1.0	1.4	1.4	1.4	1.0	1.4	1.0	1.4	2.0	0.5	0.5	1.0	0.5	1.0	1.5	0.5	1.5	1.5	1.1
Blue Acetate Rayon Fabric Dyed with 1.0 per cent Celanthrene Blue on Drum of Cabinet I, 105 ± 1° F. 120 Hours	3.8	2.8	3.8	3.2	4.2	2.3	3.2	3.6	4.1	2.7	2.8	3.8	3.3	2.9	3.6	3.2	3.3	3.7	1.8	2.7
Blue Aetate Rayon Fabric Dyed with 1.0 per cent Celathrene Blue on Drum of Cabinet II, 105 ± 1° F. 120 Hours	4.1	4.7	3.8	3.6	2.7	3.6	2.7	3.6	3.6	4.2	3.8	3.8	4.1	5.0	2.7	2.8	2.7	1.8	3.7	3.2
Green Basket Weave Fabric of Mercerized Cotton Placed on Drum of Cabinet I, 105 ± 1° F. 120 Hours	4.9	4.3	4.4	4.9	4.9	6.0	4.4	5.8	4.4	4.4	3.2	4.4	4.4	4.4	3.9	3.2	4.4	5.0	5.0	3.9
Rose Spun Aralac and Viscose Rayon Fabric Placed on Drum of Cabinet II, 105 ± 1° F. 120 Hours	3.3	0.9	0.5	0.9	2.7	2.7	1.8	1.8	1.4	1.4	0.5	0.9	1.4	0.9	2.9	1.8	1.4	1.4	1.8	1.8

TABLE III

Average Units of Color Difference Samples Mounted on Cardboard and Exposed Directly to Light of the Fade-Ometer

	5 Hours	10 Hours	15 Hours	20 Hours	25 Hours	30 Hours	40 Hours	60 Hours	80 Hours	100 Hours
Calibration Paper B—Direct Exposure Controls..	6.7	7.9	7.1	13.8	16.5	18.2	x	x	x	x
Calibration Paper B—Intermittent Controls	7.1	8.3	11.3	13.0	14.8	16.0	x	x	x	x
Blue Viscose Rayon Fabrics Intermittent Controls	0.7	0.0	0.7	0.8	1.5	0.0	1.8	1.3	1.7	1.5
Celanthrene Blue AcetateRayon Intermittent Controls	1.9	1.1	1.9	2.8	5.4	4.8	5.1	9.3	x	x
Green Cotton Fabric (Basket Weave)—Intermittent Controls	2.8	3.2	3.8	3.5	4.3	4.7	3.5	4.9	x	x
Rose Spun Aralac and Viscose Rayon Fabric.....	1.7	1.3	1.0	1.0	2.4	1.2	3.2	5.9	x	x

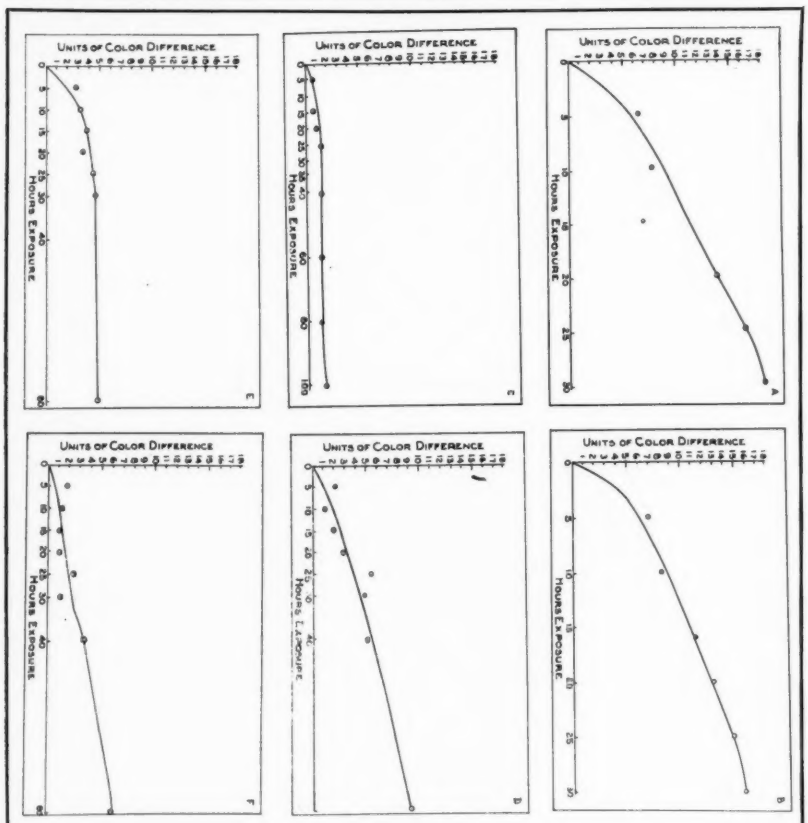


Figure 9

A. Color Difference, Calibration Paper B Exposed in Fade-Ometer at the time Calibration Paper B was hung on Rod Behind Glass of Cabinet.

B. Color Difference, Calibration Paper B Exposed in Fade-Ometer at the time Calibration Paper B was placed on Drum inside of Cabinet.

C. Color Difference, Blue Spun Viscose Rayon Exposed in Fade-Ometer at the time Blue Spun Fabrics was placed on Drum inside of Cabinet.

D. Color Difference, Cellulose Acetate Dyed with 1.0 per cent Celanthrene Blue Exposed in Fade-Ometer at the time the Cellulose Acetate Dyed Fabric was placed on Drum inside of Cabinet.

E. Color Difference, Green Basket Weave Fabric Exposed in Fade-Ometer at the time the Green Cotton Fabric was placed on Drum inside of Cabinet.

F. Color Difference, Rose Spun Aralac and Viscose Exposed in Fade-Ometer at the time the Rose Spun Aralac and Viscose Fabric was placed on Drum inside of Cabinet.

Exposure of Calibration Paper B and Textile Fabrics Placed on the Drum Inside of the Aging Cabinet, Compared with Direct Exposure in the Fade-Ometer

The color difference units obtained when the specimens exposed on the revolving drum revealed that the variation between the areas of Calibration Paper B within the same cabinet was negligible. The variation which occurred between Cabinet I and Cabinet II, however, was greater than that within each box. Greater variation occurred inside of Cabinet I than in Cabinet II.

The blue spun viscose rayon was colorfast to direct exposure to light, showing a color difference only of 1.8 units after 100 hours of direct exposure. Hence no visual change occurred in the fabric which was placed on the drum in the aging cabinet. Results also indicated that the exposure time of fabrics placed on the drum would have to be longer than that for specimens hung on the rods at the window, if the same results were obtained. This is understandable because of the greater difference.

The variation between Cabinet I and Cabinet II as determined by the color difference units obtained on the cellulose acetate rayon fabric dyed with 1.0 per cent Celanthrene Blue was 5.9 per cent.

From the color difference calculations on the green cotton, the blue acetate rayon, and the rose spun fabric of Aralac and viscose rayon, fading again was less severe on the roll than from direct exposure within the Fade-Ometer.

Test Specimens Placed Across Drum

The above measurements indicated that it was desirable to place specimens across the drum with each test swatch measuring 15 inches in length on the filling direction of the fabric and four inches in width or on the warp of the fabric. This size of specimen would be sufficient for bursting strength measurements, fluidity determinations, and reflectometer readings.

The data show also that control of the conditions of test and increase of test specimen size have resulted in lengthening rather than shortening the period of the test. It was apparent from the results obtained that the exposed fabrics should be brought into closer alignment with the most intense rays of the carbon arc of the Fade-Ometer. The design of the FDAR type of Fade-Ometer made it impossible to effectuate this change using this instrument, although the FDA instrument lent itself to this modification. By removing the doors, raising the sample rack, and raising the cabinets on the table by means of wooden blocks, the samples were brought into direct line

(Concluded on Page 640)

Qualitative Analysis of Textile Processing Agents

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INTRODUCTION

FOR the past several years, the author has been concerned with the development and production of various textile processing agents. Insight developed by this experience, together with an accumulation of known qualitative analytical techniques and development of new tests, has made the qualitative analysis of many classes of textile processing agents a relatively simple and straightforward procedure. This paper is presented in the hope that these techniques may prove valuable to others in the textile and related chemical industries.

This article is to be concerned primarily with the qualitative analysis of the more common textile processing agents. However, quantitative procedures will be included whenever such procedures are important for qualitative identification.

As a rule, before starting an analysis, certain information is available regarding the sample which places it within one or two narrow classes of processing agents to the exclusion of all others, thus limiting the number of tests which need be performed for complete analysis. Such information should always be considered. However, this scheme of analysis will assume in general that nothing is known about the sample.

PRELIMINARY TESTING

The procedure consists essentially of the following steps:

1. Classification of the compound into one or two narrow application groups.
2. Ultimate analysis based on certain specific tests related to such groups.

The completeness of success of the analysis of a sample will oftentimes be based upon the ability of the chemist to separate the constituent parts so that each may be analyzed individually, and whenever possible, general methods for separation will be included. However, much preliminary information may be gained from the original sample *in toto*.

An unknown sample should be subjected to the following classification test:

I. Appearance and odor

II. Solubility and behavior in water

A. 0.5 g. of the sample should be stirred with 25 cc. distilled water. Solubility in cold water should be noted; the solution should then be brought almost to the boil and the solubility noted at that temperature.

B. A portion of the above solution should be cooled and its pH determined.

C. If the solution is alkaline, a portion should be tested by noting the effect of adding dilute HCl until the solution is made acid to congo red indicator; if the solution is acid, it should be tested by noting the effect of adding dilute NaOH until the solution is alkaline.

D. A portion of the aqueous solution should be tested by nothing the effect of adding a few drops of 1% calcium chloride solution.

III. Solubility in methanol

A. 2 g. of the sample should be stirred with 25 cc. of anhydrous methanol. The solubility should be noted both at room temperature and at the boil, then again when the solution has been cooled to room temperature.

IV. Ignition

A. In the event the material is completely soluble in methanol, a small portion of the sample is carefully ignited, and the following factors noted:

1. Whether or not there is any charring; if so, what odors are evolved.
2. During charring, the vapors evolved should be tested for ammonia by holding in them a piece of moistened red litmus paper.
3. Any ash should be tested for the presence of sulfate, phosphate, silicate, borate, sodium, potassium, aluminum, magnesium, zirconium, among others.

B. In the event there is any matter insoluble in cold methanol, the solution is filtered and the following tests made:

1. A portion of the alcohol insoluble matter is tested for its solubility in cold and hot water. If partly or completely soluble in hot water, this aqueous solution should be tested by Procedures 1, 2, 3 & 4. (Note: The various special qualitative procedures which are used in this scheme of analysis are all grouped together for convenience, and they will be found immediately following this section on Preliminary Testing.)
2. Another portion of the alcohol insoluble matter is washed with alcohol, then carefully ignited and tested according to IV—A, above.
3. The filtrate is gently heated until the alcohol has evaporated, then the residue is ignited and tested according to IV—A above.

V. Ionic Charge

If organic matter has been detected by the charring test under IV—A or IV—B, a 5% aqueous solution of the unknown should be prepared and tested by immersing therein 2 copper strips connected to a 45 volt battery. Accumulation of organic matter (oftentimes evidenced by a slimy or soapy feeling) on the anode indicates anionic; accumulation on the cathode indicates cationic matter; no accumulation indicates non-ionic matter.

The results of the above tests should be compared with Table I in order to facilitate and limit further work.

QUALITATIVE TESTS

Procedure 1—Test for Starch and Dextrine

Render the solution which is to be

TABLE I, PART 1

Classification of Textile Processing Agents on the Basis of Preliminary Testing

	Cationic Agents		*Delusterants*		*Flameproofing Agts.*	
	1°, 2°, 3° Types	*4° Type*	*Pigment Type*	*Salt Type*	*Salts*	*Emulsions*
Appearance	Wh. to tan col. pastes or powd.		Wh. or tan col. pastes	Us.2 com. Wh. Powd.	Wh. powd. cl. liq.	Wh. to br. emul.
Odor	Acetic or Formic Acid, amine-like	....	None	None	None	Us. org. solvents
Solubility in Water	Cl. to opal.		Wh. to gray suspensions	Each com. cl. sol.	Cl. sol.	Wh. to tan emul.
pH of 3% Aqueous Solution	Acid	Close to neut.	Close to neut.	One com. acid; one alk.	Us. close to neut.	Us. close to neut.
Addition of NaOH to Aqueous Solution	Ppt.	No effect	No effect	Us. ppts. one com.	Ammonia evolved	No Effect
Addition of HCl to Aqueous Solution	Incr. sol.	No effect	Evol. of CO_2H_2S	Occ. evol. Co_2 from one com.	No effect	No effect or emul. breaks
Addition of $CaCl_2$ to Aqueous Solution	No effect	No effect	No effect	May ppt. one com.	Occ. ppt.	No effect or emul. breaks
Solubility in Methanol	Compl. Sol. (additives may be ins.)		Insol. (Disp. Agt. us. sol.)	Insol.	Ins. (wetting agt. or softeners may be sol.)	Ins. (Disp. Agt. or plasticizer may be sol.)
Ignition of Methanol-Soluble Matter						
Odor	Fatty	Fatty	Fatty	....	....	....
Vapors Evolved	Ammonia	Ammonia	....	....	....	....
Ash	None	Occ. Cl, or SO_4	Na, K, SO_4	....	....	....
Ignition of Methanol-Insoluble Matter						
Odor	Burning Paper		None	None	Ammonia	Choking
Vapors Evolved	....	....	None	None	Ammonia	HCl
Ash	None	Cl, SO_4	Na, K, Ba, Ca, Ti, Zn, SO_4, CO_2, S	Na, K, Ba, Ca, Al, Co_2, SO_4	Na, Cl, PO_4 SO_4, BO_4	Sb, Cl, Sn
Ionic Charge	Cationic	Cationic	Disp. Agt. us. anionic	....	....	....

KEY TO ABBREVIATIONS USED IN TABLE I

1. 1°—Primary
2. 2°—Secondary
3. 3°—Tertiary
4. 4°—Quaternary
5. Agt.—Agent, agents
6. Alk.—Alkaline
7. Br.—Brown
8. Cl.—Clear, Clearly
9. Coag.—Coagulates, Coagulation
10. Col.—Colored
11. Com.—Component
12. Compl.—Completely
13. Decr.—Decrease
14. Disp.—Dispersing
15. Emul.—Emulsion, Emulsifying
16. Evol.—Evolution, Evolves
17. Formald.—Formaldehyde
18. Ins.—Insoluble
19. Liq.—Liquid
20. Neut.—Neutral
21. Occ.—Occasionally
22. Opal.—Opalescent
23. Or.—Orange
24. Powd.—Powder
25. Sl.—Slightly
26. Sol.—Soluble
27. Soln.—Solution
28. Us.—Usually
29. Wh.—White

TABLE I, PART 2

Classification of Textile Processing Agents on the Basis of Preliminary Testing

	Mercerising Agents	*Soaps*		*Softeners*
		Amine Type	*Fixed Alkali Type*	
Appearance	Straw to ruby col. liq.	Straw to red col. liq. or pastes	Wh. to br. gels, pastes powd., liq.	Straw to red col. oils Wh. to tan pastes
Odor	Us. phenolic	Fatty, ammoniacal	Fatty, castor oil, etc.	Castor oil, Tallowy, etc.
Solubility in Water	Varies	Cl. to opal. sol.		Cl. sol. to milky emul.
pH of 3% Aqueous Solution	Varies	7-10	8-13	Us. close to neut.
Addition of NaOH to Aqueous Solution	Incr. sol.	No effect	No effect	No effect
Addition of HCl to Aqueous Solution	Us. decr. sol.	Compl. pptn.	Compl. pptn.	Us. no effect
Addition of $CaCl_2$ to Aqueous Solution	....	Compl. pptn.	Compl. pptn.	Sl. to cons. incr. in turbidity
Solubility in Methanol	Sol.	Sol.	Sol. (except for inorg. builders)	Sol. (except for large amts. of unsap. matter or inorg. salts)
Ignition of Methanol-Soluble Matter				
Odor	Phenolic	Fatty	Fatty	Fatty
Vapors Evolved	....	Ammonia	....	....
Ash	Na, K, SO_4	None	Na, K	Na, K, SO_4
Ignition of Methanol-Insoluble Matter				
Odor	....	....	....	....
Vapors Evolved	....	....	....	....
Ash	....	....	PO_4 BO_4 CO_2	SO_4 BO_4 PO_4
Ionic Charge	Anionic	Anionic	Anionic	Anionic

TABLE I, PART 3
Classification of Textile Processing Agents on the Basis of Preliminary Testing

	Synthetic Resins		*Synthetic Surface Active Agents*		
	Thermo Setting	*Thermo Plastic*	*Anionic*	*Non-Ionic*	*Cationic*
Appearance	Cl. syrup's wh. pastes, granular powd.	Cl. liq. or emul.	Amber to red col. liq. gels or pastes; wh. or tan powd.	Amber col. liq. gels, pastes; wh. powd.	
Odor	Formald.	Org. solvents, or Resin Monomer	Fatty Amide, org. solvent, naphthalene, etc.	....	See Cationic Agents
Solubility in Water	Cl. to opal. solns.	Varies	Cl. to opal.	Cl. to opal.	
pH of 3% Aqueous Solution	4.5-8.5	Varies	Us. close to neut.	Neut.	
Addition of NaOH to Aqueous Solution	Us. no effect	Us. no effect	No effect	No effect	
Addition of HCl to Aqueous Solution	Us. gels (after standing)	Occ. causes coag.	No effect	No effect	
Addition of $CaCl_2$ to Aqueous Solution	No effect	Occ. causes coag.	Us. no effect	No effect	
Solubility in Methanol	Ins.	Ins. (except for disp. agt. or plasticizer)	Sol. (except for inorg. salts)	Sol. (except for inorg. salts)	
Ignition of Methanol-Soluble Matter					
Odor	....	....	Fatty	Fatty	
Vapors Evolved	....	Occ. NH_3	Occ. NH_3	....	
Ash	....	Occ. SO_4	$SO_4PO_4BO_4$	None	
Ignition of Methanol-Insoluble Matter					
Odor	Formald. burning feathers	Us. odor of Monomer	....	....	
Vapors Evolved	Ammonia	....	....	....	
Ash	Us. very sl.	....	$SO_4PO_4BO_4CO_3$	$SO_4PO_4BO_4CO_3$	
Ionic Charge	....	May be anionic or cationic	Anionic	Non-ionic	

TABLE I, PART 4
Classification of Textile Processing Agents on the Basis of Preliminary Testing

	Thickeners and Sizes (Natural)	*Water Repellents*		
		Non-Durable	*Semi-Durable*	*Durable (4° Type)*
Appearance	Wh. to tan col. pastes or powd.	Wh. emul.; liq. or gels.	Cl. liq. & milky emul.	Tan col. pastes or powd.
Odor	Pastes are us. perfumed	Acetic or formic acid	....	Us. 3° amines and solvents
Solubility in Water	Cl. to opal.	Milky emul.	....	Cl. to opal.
pH of 3% Aqueous Solution	Us. sl. acid or neut.	3-6	3-6 (Clear) 7-10 (Emul.)	2-5
Addition of NaOH to Aqueous Solution	Us. incr. sol. Occ. thickens	Coag.	Ppts. (Clear); no effect (Emul.)	Coag.
Addition of HCl to Aqueous Solution	No effect	No effect	No effect (Clear); Ppts. (Emul.)	No effect
Addition of $CaCl_2$ to Aqueous Solution	No effect	No effect	No effects (Clear); Ppts. (Emul.)	No effect
Solubility in Methanol	Insol. (except for softeners)	Insol.	Insol. (except for emul. agts.)	Partly soluble
Ignition of Methanol Soluble Matter				
Odor	....	....	(Properties of Emul.): fatty	3° Amines
Vapors Evolved	....	....	Occ. NH_3	HCl
Ash	....	....	Na, K, SO_4	Us. sl.
Ignition of Methanol-Insoluble Matter				
Odor	Burning paper or feathers	Fatty, burning feathers	(Prop. of Clear) Acet. or Formic	....
Vapors Evolved	Occ. NH_3	Ammonia	Acid	....
Ash	Us. none; occ. BO_4	Al.	Al, Zr	Cl, SO_4 PO_4
Ionic Charge	....	Cationic	Cationic (Combination)	Cationic

tested slightly acid with dilute HCl, and add 1 drop of 0.01 N Iodine solution. A deep blue color indicates starch, an intense violet color indicates partially degraded dextrines, and a brown or reddish color indicates completely degraded dextrines. Solids or powders should be dissolved in water before performing this test.

Procedure 2—Test for Proteins: Biuret Test

To one cc. of the solution to be tested, add 5 drops of 45% KOH; heat nearly to the boil and then cool to room temperature. Add 2 drops of 5% $CuSO_4$ solution. An intense violet color indicates the presence of protein.

Solids or powders should be dissolved in water before performing this test.

The color obtained by the different proteins is somewhat characteristic, and may occasionally be used for identification; in which case, it is useful to perform the test with known samples for comparison. Certain amines and amides interfere, giving a positive test in the absence of protein.

Procedure 3—Test for Casein: Millons Test

Material which is to be subjected to this test should be dissolved in water (or in dilute NaOH, if necessary) then adjusted to pH9 with nitric acid. The solution is then heated with half its volume of Millon's reagent. The development of a coagulated red mass indicates casein. Since the reaction depends upon the presence of tyrosine, it is generally limited to "whole" proteins such as casein and soya, and is not generally given by degraded proteins such as animal glue or gelatin.

Procedure 4—Test for Vegetable Gums

To the aqueous solution which is to be tested add basic lead acetate solution. A white, flocculent precipitate shows the presence of vegetable gums. Starch yields a turbidity with this reagent but no precipitate. Note, however, that sulfates, phosphates and silicates also precipitate lead solutions; the absence of these substances must be proved before the above test can be deemed conclusive.

Procedure 5—Ignition Test

Except in cases where the sodium ion is being sought, the sample should be rendered slightly alkaline with NaOH and then gently heated until any water present is evaporated. Heating is increased until compound starts to burn. The flame is then extinguishel by covering the crucible with a watch glass. Without delay the watch glass is removed and the odor of the vapor is noted. The flaming and extinguishing are repeated, and the vapors are tested with moistened litmus paper. The ignition is then continued until all organic matter is almost burnt off. The crucible is cooled, the residue is moistened with a few drops of 3% H_2O_2 (to convert sulfides to sulfate), and the ignition is then completed. If there is any ash residue, it should be tested by conventional inorganic qualitative procedures for appropriate anions and cations.

Procedure 6—Hydrolysis of Fatty Amides and Esters

Secondary amides are quite resistant to hydrolysis, and they require very vigorous conditions; however, it is often possible to decompose this type by boiling a 1-2 gram sample under reflux with 50 cc. of 25-50% H_2SO_4 (or 20-30% HCl) for 6-8 hours. Primary amides decompose more readily; a 6-8 hour boil with 5% H_2SO_4 will usually suffice. Esters may be hydrolyzed by boiling 1-2 hours with 1% H_2SO_4.

On completion of hydrolysis (as evidenced by lack of frothing or separation of insoluble oily matter), the acid solution should be cooled and extracted with ether.

The ether solution is washed with distilled water until neutral to methyl orange, and the fatty matter is then isolated by evaporation of the solvent. The fatty matter thus obtained may be identified by determination of acid value, melting point, iodine value and acetyl value.

The aqueous acid layer, after extraction with ether, should be diluted if necessary, and rendered strongly alkaline with NaOH. Heat to the boil and check vapors for the presence of ammonia. Adjust to pH 9, and then evaporate to dryness on the steam bath. The residue, containing considerable inorganic salt is thoroughly extracted with methanol, and the methanol soluble organic matter is isolated by evaporation of the solvent. The matter thus isolated may be an alkyl amine, alkylol amine, amino acid, alkyl or aryl amino sulfonate, hydroxy-alkyl sulfonate, polyhydroxy compound, etc. Appropriate tests for identification should include:

1. Sodium fusion for elementary analysis. *(16)*

2. Determination of amine equivalent. *(7, 10)*

3. Determination of hydroxyl value (Note that the determination of hydroxyl value in the presence of amino groups requires a special technique. *(18)*

Procedure 7—Test for Carboxylic Esters *(5)*

To one drop of the sample or an equivalent amount of solid, add 10 drops of saturated hydroxylamine hydrochloride in methanol (approx. 2 N.). Add 10 drops of 2N KOH in Methanol. Heat to boil, and boil gently for 30 seconds. Cool to room temperature, and add 10 drops of 2N HCl. Add 1 drop of 10% $FeCl_3$. The presence of carboxylic ester is indicated by an intense violet to reddish brown color.

Procedure 8—Libermann Storch Test

Dissolve a small piece of the sample in 10 drops of acetic anhydride (heating if necessory). Cool, run the solution into a depression of a white spot plate, and then add one drop of H_2SO_4 (Sp. gr. 1.53) An intense, transitory violet coloration indicates the presence of rosinic type compounds; naphthenic acids give a yellowish color which rapidly turns brownish; vinyl type synthetic resins usually give a greenish color; cumarone type resins usually give a red to orange color, occasionally greenish. An alternate method for performing this test is to place a small piece of the resin in the spot plate depression, cover it with acetic anhydride, then add the sulfuric acid. Observe color changes in the liquid and on the edges of the solid *(15)*.

Procedure 9—Test for Ammonia Salts

In a six inch test tube, place 2-3 g. of the sample to be tested, add 5 cc. of 10% NaOH. Without delay, insert a tube containing a piece of moistened red litmus paper. (See Figure I). With gentle shaking, warm the contents of the test tube in boiling water. Ammonia, and lower alkyl amine salts are indicated by the formation of a blue color on the paper.

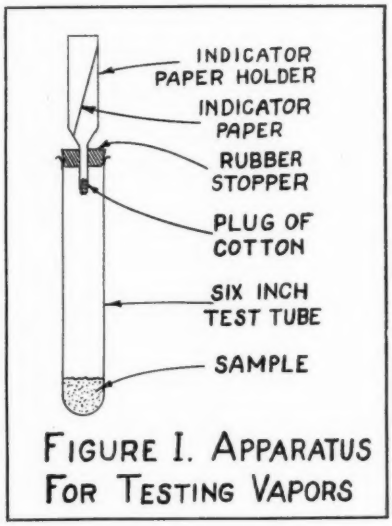

FIGURE I. APPARATUS FOR TESTING VAPORS

Procedure 10—Test for Unsaponifiable Matter

In a 6-inch test tube place two pellets of potassium hydroxide and add 5 cc. of methanol; heat over low flame until KOH has dissolved. (A slight amount of solids may remain undissolved even after prolonged heating; this is potassium carbonate and does not interfere.) Add two drops of substance to be tested, and heat at gentle boil for 5 minutes, replacing the alcohol which evaporates. Add water gradually until 15-20 cc. has been added. A turbidity or colloidal tinge which persists to the end of the water addition indicates unsaponifiable matter. As little as 2-3 per cent of mineral oil in red oil or tallow

may be detected by this test. Note: Ethanol (S.D.A. Formula 30) is satisfactory for this test, but isopropanol should not be used as it gives false negative tests.

Procedure 11—Test for Organic Sulfate Esters

In a 6-inch test tube place one-half cc. of the product to be tested, and add 8-10 cc. of 5 per cent HCl (sulfate-free). Boil the mixture for 5 minutes. Allow to stand quietly until the mixture has separated. Then carefully siphon off a portion of the clear, lower aqueous layer; to this add a few drops of nitric acid and then 2-3 drops of 10 per cent $BaCl_2$ solution. Organic sulfate esters are indicated by the formation of a white, finely divided, granular precipitate which persists even after the solution is diluted considerably.

Procedure 12—Solubility Tests for Synthetic Resins

Shake 1 g. of resin with 10 cc. of solvent at room temperature for several minutes; if solution does not occur, heat to boil and then allow to cool. Note whether resin is completely soluble, partly soluble or whether gelation or swelling occurs.

Procedure 13—Test for Formaldehyde

If the product to be tested is a synthetic resin, a portion of the material should be brought nearly to the boil with 10-20 times its weight of 5 per cent H_2SO_4. The solution is allowed to cool and then the aqueous portion is added drop-wise to freshly prepared Carbazole solution (0.1 per cent in H_2SO_4 of specific gravity 1.84). This may best be performed on a white spot plate. If formaldehyde is present, the Carbazole solution will be colored a deep blue and a blue precipitate will form on standing. A blank should be run simultaneously. The hydrolysis step may be omitted if free formaldehyde is being tested for.

Procedure 14—Carbonate Fusion

Place .5 g. of substance to be tested in a 6-inch test tube, cover it completely with anhydrous Na_2CO_3, and then heat over a low Bunsen flame. Gradually increase the heat until charring occurs. Check the odor evolved and note the presence or absence of fuming and/or distillation. Repeat the test with a fresh sample using red litmus paper in a holder as illustrated in Figure I.

GROUP ANALYSIS

Having decided in which application group a given compound lies, specific tests must then be performed to establish complete qualitative identification of the constituent parts. There is presented below the various classes together with recommended techniques for complete analysis.

Cationic Agents

A. Make a separation on the basis of methanol solubility.

1. Methanol insoluble matter should be tested by Procedures 1, 2, 3, 4, 5.

2. After evaporation of the methanol, a portion of the alcohol soluble matter should be dissolved in water. Divide the aqueous solution into three parts. To one part add dilute NaOH; to another part, add dilute HCl; compare these with the untreated part. Primary, secondary, and tertiary type amines are less soluble in alkaline solution than in acid solution; quaternary types normally are equally soluble in mild alkaline and acid solutions.

3. Quaternary type compounds may be further identified by Procedure 5 and 6. Regarding the Ignition Test, note that the presence of inorganic anions generally indicates quaternary type compounds. Moreover, hydrolysis according to Procedure 6 may yield a fatty amine or fatty alcohol rather than a fatty acid, and consideration should be given to this possibility.

4. Primary, secondary and tertiary amine type compounds should be rendered alkaline, extracted with ether, and the ether extract washed until free of inorganic alkali (use saturated brine solutions, if necessary, to prevent emulsions). The ether extract should be freed of solvent and the residue tested by Procedures 6 and 7.

Delusterants

I. Pigment Type

A. Make a separation on basis of methanol solubility.

1. Test the methanol soluble matter, after evaporation of the alcohol, by procedures described under: Soaps, Softeners, and Synthetic Surface Active Agents.

2. The methanol insoluble matter may be treated according to the following technique:

(a) Ignite a portion to check for the presence of alcohol-insoluble organic matter. In the event any appreciably charring occurs, another portion of the alcohol insoluble matter is treated with hot water, the pigment filtered off, and the filtrate tested by Procedures 1, 2, 3, 4.

(b) The residue from the ignition is washed several times with distilled water to remove water soluble inorganic salts. The water-insoluble residue may then be analyzed qualitatively by any convenient procedure (*19*).

II. Two Component Type (Semi-durable or Durable Types)

A. Each component should be gently ignited. If there is any charring, a fresh sample of the respective component should be dissolved in water and tested by Procedures 1, 2, 3, 4. If charring occurs, the presence of synthetic resins should also be considered, and tests made according to procedures outlined under Synthetic Resins.

B. After burning off all organic matter, the residue from each component should be subjected to conventional qualitative analysis for inorganic cations and anions.

Flame Proofing Agents

I. Salt Type

A. This type of compound should first be subjected to the charring test (Procedue 5) to determine whether any organic matter is present.

1. If organic matter is found present, it may be an added wetting agent, in which case it may be extracted with methanol and tested according to procedures described under Synthetic Surface Active Agents.

2. Or the organic matter may be present in bound form as an organo-metallic complex; in which case, the compound should be subjected to acid or alkaline hydrolysis, the organic substituent distilled off, salted out, or extracted with ether or other suitable solvent, and then analyzed by conventional methods for qualitative organic analysis.

3. If no organic matter is present, the compound probably consists of a mixture of inorganic salts, and may be analyzed readily by straight-forward inorganic analysis, including Procedure 9.

II. Emulsion Type

This form of product ordinarily consists essentially of an aqueous emulsion of organic flame retarders together with inorganic pigment type catalyzers. In addition, there may be resinous binders, emulsifying agents, and organic solvents. The variations of the products on the market make any specific plan of analysis unsuitable for all of them. However, the following procedure has been given satisfactory results in several instances.

A. Organic Solvents are Evident:

1. A 15-20 g. sample is subjected to steam distillation, using an appropriate solvent trap (*2*).

The solvent is isolated, and its properties are determined, such as specific gravity, boiling point, etc., for complete identification.

2. The steam distillation ordinarily will cause the emulsion to break and the water

remaining in the flask may be separated from the solids by filtration. (If the emulsion does not break follow Procedure (B-1) below.)

(a) The aqueous extract is evaporated on the steam bath to dryness. The residue comprises the emulsifying agent and may be analyzed according to procedures described under Soaps and Synthetic Surface Active Agents.

(b) The water insoluble solids are dried carefully then thoroughly extracted with methanol.

(b-1) The methanol extract will contain the plasticizers. After evaporation of the methanol, the residue should be tested by Procedures 5, 7 and 6. Notes: The ignition of this type of material is generally more informative if conducted in the presence of excess Na_2CO_3 (to prevent complete volatilization of inorganic anions). If a positive test for phosphate is obtained with Procedure 5, or if carboxylic esters are evident by Procedure 7, these should be followed by Procedure 6 for complete identification.

(b-2) The methanol insoluble matter may then be treated with appropriate solvents (such as butanol, methyl isobutyl ketone, ethylene dichloride, etc.) to effect extraction of organic flame retarders and resins from the inorganic catalyzers. This solvent soluble portion is then freed of solvent, and tested according to procedures listed under Synthetic Resins.

(c) The inorganic residue, freed of organic matter by extraction or ignition, should then be analyzed.

B. If there is no evidence of organic solvent, the steam distillation step may be dispensed with and the product treated thus:

1. Methanol is added to the emulsion until coagulation is complete. The methanol insoluble matter is isolated by filtration, and is tested according to (b-2) and (c) above.

2. The methanol filtrate, containing the emulsifying agent and/or plasticizer, is warmed gently to remove the alcohol. The residue is extracted with petroleum ether. Any matter insoluble in the petroleum ether is probably the emulsifying agent; petroleum ether-soluble matter is the plasticizer. Their analysis may be carried out as already described above.

Mercerizing Agents

A. The method which is applicable to the widest variety of products consists of the following:

1. Make a separation on the basis of solubility in methanol, and after evaporation of the alcohol, ignite a portion of the methanol soluble matter according to Procedure 5.

2. A fresh sample of the product should be rendered alkaline to phenolphthalein with NaOH, and subjected to steam distillation, using an appropriate solvent trap *(2)*. (In the event there is excessive frothing use Ca Cl_2 and etc. as described on p. 354 of the 1942 AATCC Year Book.) This steam distillation process will isolate any volatile, neutral or basic, water insoluble solvents. If any solvent is isolated at this point, it should be tested for its specific gravity, boiling point and neutral equivalent. If more than one compound is evident because of boiling points, or other factors, the solvent should be fractionated by distillation or chemical means, and data obtained for each fraction for complete identification.

3. After removal of the steam distillable neutral or alkaline solvents, the mixture in the flask should be made neutral to methyl orange with sulfuric acid, and the steam distillation continued with another trap. This treatment will isolate any volatile, acid type compounds including phenols and cresols. Inasmuch as many of these compounds have specific gravities greater than water, it may be necessary to use a trap for solvents heavier than water. This acid type distillate is freed of water and subjected to the usual specific gravity and boiling point tests, followed by determination of neutral equivalent for complete identification.

4. After the second steam distillation, the residue in the flask consists of the non-volatile substituents, which may include: higher carboxylic acids, organic sulfonates, sulfates and phosphates. Further treatment will be governed by the following factors:

(a) If sulfate or phosphate has previously been found in the ash of the methanol soluble matter, the contents of the distillation flask should be carefully evaporated to dryness. After drying, the residue is thoroughly extracted with methanol. After evaporation of the alcohol, an acid value determination should then be performed on a portion of the methanol-soluble matter. An appreciable acid value at this point indicates the presence of a mixture of a synthetic surface active agent and a carboxylic acid type compound. A negligible acid value indicates a synthetic surface active agent only. In the event a mixture is found, it may usually be resolved by an extraction with petroleum ether; the carboxylic acids being soluble and the organic sulfonates, sulfates and phosphates being insoluble. The separated constituents may then be analyzed individually by appropriate procedures described elsewhere in this paper.

(b) In the event no sulfate or phosphate was found in the ash of the alcohol soluble matter, any residue from the steam distillations probably consists of carboxylic acid type compounds. These may be extracted directly (with ethyl ether) from the distillation flask, the ether solution washed until neutral to methyl orange, and then evaporated. After evaporation of the ether, a portion of the residue should be tested for the presence of rosin and/or naphthenic acid, by Procedure 8; if these are found present, they may be separated from fatty acids on the basis of the solubility of their silver salts in ether *(20)*. The acid values, melting points, and other data of the individual constituents may then be determined for complete identification.

B. If no sulfate or phosphate is found on ignition of the alcohol extract (Paragraph A-1, above), a fairly satisfactory means of separation consists of a distillation at atmospheric pressure under an effiicent fractionating column. (The sample should be made neutral to methyl orange before distilling.) The separate fractions are isolated and tested individually according to conventional methods for qualitative analysis of organic compounds. Any non-distillable residue will probably consist of carboxylic acids; the latter may be identified according to the method described in paragraph A-4-b above.

This procedure is particularly desirable whenever water soluble, steam distillable solvents are present.

Soaps

A. Make a separation on the basis of solubility in hot methanol. Any matter which does not dissolve and which does not melt in the boiling methanol indicates inorganic builders. Any matter which is insoluble in boiling methanol but which melts, indicates substantial amounts of unsaponified fats or unsaponifiable matter. The solution should be filtered to isolate the alcohol insoluble matter.

1. The acohol insoluble matter is ignited gently and then tested for the presence of borate, phosphate, carbonate, silicate, etc.

2. The methanol filtrate is warmed gently until all the solvent has evaporated and the residue is subjected to the following tests:

(a) Perform Procedure 5, noting in particuar if alkaline vapors are evolved and, if there is any ash, whether it contains sodium and/or potassium.

(b) If alkaline vapors are evolved during ignition, perform Procedure 9. Note that if alkaline vapors are evolved during ignition and a negative test is obtained by Procedure 9, the presence of relatively non-volatile alkylolamines is indicated. These may be isolated as outlined in paragraph C-2, below:

B. If there is any evidence of organic solvent, such as pine oil, ethylene dichloride, cresols, etc., a fresh sample (rendered just acid to methyl orange with H_2SO_4 to reduce frothing) is subjected to steam distillation using the appropriate type solvent trap. The solvent is then

freed of water, fractionated if necessary by chemical or physical means, and identified by normal techniques.

C. The residue in the distillation flask from paragraph B above, or a fresh sample if no solvent is present, is extracted with ethyl ether while in the slightly acid condition.

1. The ether extract is ashed until neutral to methyl orange and then the ether is evaporated. The fatty residue is tested in the following way:

(a) Perform Procedure 10.

(b) Determine the acid and saponification values. Any substantial difference between these two values indicates the presence of unsaponified fatty matter.

(c) If the presence of unsaponifiable matter was previously indicated by Procedure 10, it should be isolated, after saponification, according to the method described on pp. 346-348 of the 1942 AATCC Year Book.

(d) Perform Procedure 8 to detect the presence of rosin acids. If a positive test is obtained, and a mixture of rosin and fatty acids appears probable, the mixture may be separated on the basis of the solubility of the silver salts of rosin acids in ether *(20)*. The separated constituents may then be tested individually for complete identification.

(e) For complete identification of the fatty acid, it is usually advisable to obtain its freezing point by the standard titer test (See pg. 334 of the 1942 AATCC Year Book.) For this test, approximately 20 g. of the fatty acids must be isolated.

2. If the presence of alkylolamines has previously been indicated, the aqueous residue, after the ether extraction, is adjusted to pH 9 and then carefully evaporated to dryness. This residue is extracted with propanol, and the alkylolamines precipitated as hydrochloride salts by passing in gaseous HCl. Identification is then often possible by determining the melting point and neutral equivalent of the hydrochloride salt *(8)*.

Softeners and Lubricants

I. Sulfated Oils and Fats

A. Make a separation on basis of solubility in hot methanol.

1. The alcoholic filtrate should be warmed until the solvent has evaporated and the residue should then be subjected to Procedures 5 and 11. Note that if a positive test for sulfate is obtained by Procedure 5 but a negative sulfate test by Procedure 11, the presence of organic sulfonates is indicated, and reference should be made to the section on Synthetic Surface Active Agents.

2. The methanol insoluble matter should be washed with hot alcohol then with ether. A portion of the residue should be dissolved in water and tested by Procedures 1, 2, and 3. The remainder of the residue should be ashed and then analyzed.

B. A fresh portion of the sample should be tested directly by Procedure 10.

C. The total alkalinity, acid value and saponification values of the sample should be determined. These data often provide very useful information regarding the manufacture and composition of sulfated fats and oils: Normal sulfation of common oils and fats gives a ratio of approximately 1:4 for (sum of acid value plus total alkalinity): (sum of total alkalinity plus saponification value). Thus, a ratio of more than one to four indicates that fatty acids were used in the manufacture; conversely, a ratio of less than one to four indicates that neutral saponifiable fats and/or oils were added after sulfation. (However, keep in mind the fact that fatty acids may be titrated to completion if neutralized with ammonia or amines (11) and the presence or absence of nitrogenous bases should be established before drawing any conclusions.)

D. With the facts obtained as described above, the steps necessary to make a complete separation for identification of constituents will be obvious. These steps may include:

1. Desulfation
2. Saponification
3. Isolation of unsaponifiables
4. Isolation of fatty acids

These procedures are described in full in the 1942 AATCC Year Book. (Note: It should be remembered, however, in evaluating the data obtained on the isolated fatty acids, that after an oil or a fat has been sulfated and then desulfated, it is not at all unusual for many of its chemical and physical properties to be greatly altered. Thus, for example, the fatty acids of the desulfated oil usually has a higher titer and lower iodine value than those of the original oil.)

II. Non Emulsifiable Yarn Lubricants (Usually characterized by an absence of ash.)

A. Perform Procedure 10.

B. Determine acid value and saponification value.

C. If unsaponifiable matter has been found present, a sufficient quantity of the product must be saponified to yield enough of the constituent parts for complete analysis of each. After saponification, the unsaponifiables may be isolated by extraction.

(1) The fatty acids (and, thereby, the original oil) may then be characterized by obtaining the acid value, titer, iodine value, hydroxyl value, etc.

(2) The unsaponifiables may be characterized primarily by specific gravity, viscosity and boiling range.

Synthetic Polymeric Compounds

To simplify the analytical procedures, there are included in this class all synthetic, high molecular weight, polymeric type compounds irrespective of application classifications. The principal uses, at the present time, for synthetic resin compounds are:

1. Creaseproofing
2. Shrinkproofing
3. Yarn Sizes
4. Thickening Agents
5. Durable or Semi-Durable Fabric Finishes
6. Pigment Binders

Because of the exceedingly wide variations which are possible with formulations containing synthetic resins, and inasmuch as this field is, even now, growing very rapidly, only the most important resinous types will be included in this scheme. For fuller analytical data, more comprehensive texts should be consulted *(3, 6, 15)*.

As usual, the success of an organic analytical procedure will often depend upon the ability of the chemist to isolate, in nearly pure form, the various constituents of a given mixture. Accordingly, it is usually desirable, and often imperative, to isolate the resinous matter before attempting ultimate analysis. And whenever a mixture of resins is present, these should be separated into as pure fractions as possible.

Isolation of resins which are dissolved in organic solvents may often be accomplished by the addition of a non-solvent, or vacuum distillation or steam distillation. Isolation of resins in emulsion form may be accomplished by coagulation with a non solvent, or inorganic salts, or by means of dialysis, etc. Wherever the presence of resinous type compounds might be suspected, the method for their isolation has been included in the foregoing schemes of the various classes of processing agents.

The data in Table II, accumulated from various sources *(3, 6, 14, 15)* characterize the most common polymeric compounds in their pure form but with the exception that the data describing the appearance may refer to the appearance of the resin in its commercially available form.

The recommended procedure for the identification of these polymeric compounds is as follows:

A. Perform a sodium fusion *(16)* on a portion of the resin, and test for the presence of Nitrogen, Halogen and Sulfur. Note that a positive test for sulfur indicates that the resin is outside the scope of this scheme.

B. Perform solubility tests, according to Procedure 12, using the various solvents listed in Table II.

C. Determine the acid value, saponification value, and acetyl value by standard procedures *(15)*.

D. Run confirmatory tests which may apply, such as Procedures 13, 7, 8, 5 and 14.

TABLE II, PART 1

Properties of Polymeric Compounds Commonly Used in Textile Processing

Test	*Procedure No.*	*Urea Formaldehyde*	*Melamine Formaldehyde*	*Methyl Cellulose*	*Alkali Soluble Cellu.*	*Ethyl Cellulose*	
						Low Ethoxy	*High Ethoxy*
Appearance	—	Crease prf'g: wh. pastes or powd; shrink-prf'g: Cl. syrups	Cl. Syrups	Wh. powd; Cl. vis. liq.	Linters; Cl. vis. liq.	Fib. powd; Cl. vis. liq.	Gran. powd; solvent soln. or emul.
Solubility	12						
Water		Sol.	Sol.	Sol.	Ins.	Ins.	Ins.
3N HCl		Sol. gels on stand.	Sol. gels on stand	Sol.	Ins.	Ins.	Ins.
6% NaOH		Us. Ins.	Ins.	Sw. & dis. slo.	Sw. & dis.	Sw. & dis.	Ins.
95% Ethanol		Ins.	Ins.	Ins.	Ins.	Ins.	P. sol; gels
Ethyl Acetate		Ins.	Ins.	Ins.	Ins.	Ins.	Sol.
Pyridine		Ins.	Sol.	Ins. gels	Ins.	Ins.	Sol.
Acetic Acid (glac.)		Ins.	Sol.	Ins. gels	Ins.	Ins.	Sol.
Benzene		Ins.	Ins.	Ins. gels	Ins.	Ins.	Us. sol.
Sodium Fusion	—						
Nitrogen		Pos.	Pos.	Neg.	Neg.	Neg.	Neg.
Chlorine		Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Sulfur		Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Carboxylic-Esters	7	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Formaldehyde	13	Pos.	Pos.	Neg.	Neg.	Neg.	Neg.
Liebermann-Storch	8	Neg.	Neg.	Res. slo. turns Y. to sl. Gr.	Neg.	—	Or. to Br. to Black
Ignition	5						
Odor		NH_3, burn'g hair	Formald.	Pung. burn. paper	Burn. paper	Burn. paper	Burn. paper
Char		Pos.	Pos.	Pos.	Pos.	Pos.	Pos.
Fume		Very sl.	Sl. Wh.	Cons.	Cons.	Cons.	Hvy. Wh.
Distillate		Neg. (ex. for ether type)	Neg. (ex. for-ether type)	Neg.	Neg.	Neg.	Sl.
Carbonate Fusion	14						
Odor		NH_3	Formald.	—	—	—	—
Char		Pos.	Pos.	—	—	—	—
Fume		Neg.	Neg.	—	—	—	—
Acetyl Number		0	0	120	200-300	100-250	65
Acid Number		0	0	5	—	10	10
Saponification Number		0	0	0	0	0	0

KEY TO ABBREVIATIONS:

Acro: Acrolein
Alk: Alkaline
Br: Brown
Cl: Clear
Compl: Completely
Cons: Considerable
Dis: Dissolves
Emul: Emulsion
Fib: Fibrous
Formald: Formaldehyde
Gran: Granular
Hvy: Heavy
Ins: Insoluble
Liq: Liquid
Neg: Negative
Or: Orange
P:: Partly
Pos: Positive
Powd: Powder
Pung: Pungent
Sl: Slight-ly
Slo: Slowly
Sol: Soluble
Soln: Solution
Sw: Swells
Us: Usually
Vi: Violet
Vis: Viscous
Wh: White

Synthetic Surface Active Agents

Inasmuch as this type of compound often contains considerable amounts of solvents and/or inorganic builders and diluents besides the active organic ingredient, it is usually advisable to isolate the surface active agent before attempting analysis.

A. If any solvent is evident, it may usually be separated by steam distillation. The properties of the isolated solvent may then be determined for identification.

B. The residue in the distillation flask (or an original sample, if the steam distillation is unnecessary) should then be evaporated nearly to dryness. The residue is then extracted with hot, anhydrous methanol. (All the common surface active agents, with the exception of the proteinaceous type, are substantially soluble in hot methanol.

1. A portion of the methonal insoluble matter should be tested by Procedure 5.
   (a) If charring occurs, and ammonia is evolved, the presence of a proteinaceous type compound is indicated, in which case, other portions should be tested by Procedures 2 and 6.
   (b) If charring occurs and no ammonia is evolved, the presence of a cellulosic type detergent aid or a carbohydrate type frothing aid, is indicated.
   (c) Any ash which remains, from Procedure 5, should be analyzed for inorganic anions and cations.
2. The methanol filtrate is warmed gently until all the solvent has evaporated. Before proceeding with the analysis this residue should be tested for the presence of inorganic sulfate (which would interfere with further tests): A small portion is dissolved in distilled water, and rendered acid by the addition of nitric acid. Two drops of 10% $BaCl_2$ solution is then added, and the solution observed for the formation of a precipitate. (Care should be exercised in evaluating this test as some types of sulfur-containing surface active agents give a colloidal appearance on the addition of $BaCl_2$. Ordinarily, however, such organic precipitates remain colloidally dispersed or rise to the surface as a globular mass; whereas, an actual precipitate of $BaSO_4$ is highly crystalline and settles rapidly). If

TABLE II, PART 2

Properties of Polymeric Compounds Commonly Used in Textile Processing

Test	Procedure No.	Alkyd Resins		Polyvinyl Acetate	Polyvinyl Alcohol	Polyvinyl Chloride	Polyacrylates	Polystyrenes
		Regular	Oil Modified					
Appearance	—	Solvent or alk. aqueous soln; emul.	Solvent or alk. aqueous soln; emul.	Gran. powd; milky emul.	Gran. powd; vis. aqueous soln.	Gran. powd; milky emul.	Gran. powd; milky emul.	Gran. powd; milky emul.
Solubility	12							
Water		Us. Ins.	Us. Ins.	Ins.	Sol.	Ins.	Ins.	Ins.
3N HCl		Ins.	Ins.	Ins.	Sol.	Ins.	Ins.	Ins.
6% NaOH		P. Sol.	P. Sol.	Ins.	Ins.	Ins.	Ins.	Ins.
95% Ethanol		P. Sol.	P. Sol.	Sol.	Ins.	—	Ins.	Ins.
Ethyl Acetate		Sol.	—	Sol.	Ins.	Ins.	Sol.	P. Sol.
Pyridine		Sol.	—	Sol.	Ins.	Ins.	Sol.	Sol.
Acetic Acid (Glac.)		Sol.	—	Sol.	Ins.	Ins.	Sol.	Ins.
Benzene		Ins. gels.	Us. Sol.	Sol.	Ins.	Ins.	Sol.	Sol.
Sodium Fusion	—							
Nitrogen		Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Chlorine		Neg.	Neg.	Neg.	Neg.	Pos.	Neg.	Neg.
Sulfur		Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Carboxylic	7							
Esters		Vi.	Vi.	Vi.	Red to Vi.	Neg.	Br. to Vi.	Neg.
Formaldehyde	13	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
Liebermann-Storch	8	Us. Neg; Occas. Br.	drk. Br.	Res. slow. turns Gr.	Res. turns Br. to sl. Gr.	Res. slow. turns Blue	Neg. or Br.	Neg.
Ignition	5							
Odor		Choking, Acro.	Oily, Acro,	Pung.	Pung.	Pung.	Sweet (Monomer)	Styrene
Char		Pos.	Neg.	Pos.	Sl.	Pos.	Sl.	Neg.
Fume		Sl.	Sl.	Hvy. Y.	Much	Hvy. Y.	Sl. Wh.	Cons. Wh.
Distillate		Cons.	Cons.	Sl.	Neg.	Neg.	Compl.	Compl.
Carbonate Fusion	14							
Odor		Formald. & musty	—	—	—	—	—	—
Char		Pos.	—	—	—	Pos.	—	—
Fume		Sl.	—	—	—	Hvy. Y.	—	—
Acetyl Number		20-100	10-70	0	1000-1270	0	—	0
Acid Number		10-200	20-100	<10	<10	<10	<10	<5
Saponification Number		150-375	140-225	600	120-0	0	360-570	0

TABLE III

Identification of Synthetic Surface Active Agents
Tests on Alcohol Soluble Matter

	Ignition (Procedure 5)		Elementary Analysis	Test for Sulfate in Aqueous Extract After 5 min. boil with HCl (Procedure 11)		Test with $CuSO_4$	Test for Carboxylic Esters (Procedure 7)	Acid Value of Fatty Matter Isolated from Hydrolysis (Procedure 6)
	Ammonia Evolved	Sulfate In Ash		5% HCl	Conc. HCl			
Highly Sulfated Oils	Neg.	Pos.	S	Pos.	Pos.	Pos.	Pos.	160-200
Alkyl-Aryl Sulfonates	Neg.	Pos.	S	Neg.	Neg.	Pos.	Neg.	-0-
Fatty Alcohol Sulfates	Neg.	Pos.	S	Pos.	Pos.	Neg.	Neg.	-0-
Fatty Amide Sulfates	Pos.	Pos.	N,S	Pos.	Pos.	Pos	Neg.	200-265
Fatty Amide Sulfonates	Pos.	Pos.	N,S	Neg.	Neg.	Neg.	Neg.	200-265
Fatty Acid Ester Sulfates	Neg.	Pos.	S	Pos.	Pos.	Pos.	Pos.	180-265
Fatty Acid Ester Sulfonates	Neg.	Pos.	S	Neg.	Pos.	Neg.	Pos.	190-200
Petroleum Sulfonates	Neg.	Pos.	S	Neg.	Pos.	Varies	Neg.	-0-
Polyethylene Glycol Fatty Acid Esters	Neg.	Neg.	—	Neg.	Neg.	Neg.	Pos.	200-265
Polyethylene Glycol Fatty Alcohol Ethers	Neg.	Neg.	—	Neg.	Neg.	Neg.	Neg.	——
Fatty Acid Polyfunctional Amide	Pos.	Neg.	N	Neg.	Neg.	Neg.	Neg.	250-270

KEY TO ABBREVIATIONS: N: Nitrogen; Neg: Negative; Pos: Positive; S: Sulfur

a positive test for inorganic sulfate is obtained, the residue should be taken up again in anhydrous methanol and refiltered. The filtrate is warmed to evaporate the alcohol, and the methanol soluble residue is tested as indicated below, the results obtained being compared with Table III.

(a) Perform Procedure 5, noting in particular if any ammonia is evolved during ignition, and whether there is any sulfate in the ash. If there is any doubt regarding these factors with the ignition, a sodium fusion should be performed, and an elementary analysis for nitrogen and sulfur should be made for confirmation.
(b) Perform Procedure 11.
(c) Repeat Procedure 11, but use concentrated HCl instead of the 5% HCl.
(d) Perform Procedure 6; any insoluble, oily matter isolated thereby should be tested for its acid value, hydroxyl value, and melting point.
(e) Dissolve .2-.3 g. in 5 cc. water and then add 5 to 6 drops of 10% $CuSO_4$. Note the presence of any precipitate or marked turbidity *(12)*.
(f) Perform Procedure 7.
(g) If the above tests have indicated the presence of a nitrogen-free organic sulfonate, further useful information can often be obtained by treatment of the methanol soluble matter with p-toluidine hydrochloride, followed by titration with NaOH solution (13).

Thickeners and Sizes

Included under this classification are the naturally-occurring polymeric type compounds which are commonly used in the textile trade as thickeners, sizes, and finishing agents. The scheme of analysis will detect, either alone or in mixtures, starches, dextrines, glue, casein, gum arabic and gum tragacanth. However, to save unnecessary work, preliminary tests should be made by Procedures 1, 2, 3 and 4 before undertaking complete analysis.

A. If the product is in the form of an aqueous solution or paste, it should be brought to a pH of 7.0-7.5 by the addition of dilute NaOH or HCl. Sufficient methanol is then added to effect complete precipitation of the carbohydrates and proteins. The precipitate is washed with methanol and then with ether. If the product is in the form of a powder it should be washed with alcohol and then ether (to eliminate alcohol and/or ether soluble additives). (The combined alcohol-ether filtrates should be warmed to evaporate the solvent; if there is any residue, it should be tested by procedures outlined under Soaps, Softeners, and Synthetic Surface Active Agents.) In any case, the alcohol-ether insoluble matter is treated according to the following:

1. Perform Procedure 5 on a portion.
2. The balance of the alcohol-ether insoluble matter is taken up in 15-20 volumes of boiling water, and the solution filtered. Any insoluble residue will consist of the albuminoids (casein) and may be analyzed according to (3) below. In the filtrate will be starches, dextrines, the various gums and gelatin, which may be analyzed according to the following:
   (a) A small portion of the aqueous filtrate should be tested by Procedure 1; if a positive test for starch is obtained, a portion of the original product should be examined under the microscope. The type of starch may usually be identified by noting the size and shape of the starch granules and comparing with known samples (1).
   (b) The balance of the aqueous filtrate is treated with an excess of basic lead acetate, whereby gum arabic and/or gum tragacanth are precipitated as a gelatinous, lumpy mass, which becomes coherent on shaking. The precipitate produced by basic lead acetate is separated by filtration and washed with cold water. In the filtrate are found, unchanged, whatever quantities of dextrine, starch or glue that may be present. A positive Biuret test on the filtrate at this point indicates glue or gelatin.
   (c) The precipitate produced by lead acetate, after the wash water has drained off, is treated without delay as follows:
   Acetic Acid (50%) is poured upon the precipitate in the funnel until it is completely covered, and the whole is allowed to stand for some time, the filtrate being caught in a clean beaker. Gum Arabic dissolves in the acetic acid and filters through; any gum tragcanth which is present remains as a swollen, tenacious, thready mass.
   (d) The filtrate from (c) above, is tested for gum arabic as follows: Fehling's solution is added slowly until the white precipitate of lead sulfate thus produced begins to dissolve. Sodium hydroxide solution is then added in excess until the sulfate precipitate has completely redissolved; the mixture is shaken carefully, warmed by passing through a Bunsen flame a few times and then allowed to stand at room temperature. If Gum Arabic is present, at once or after a short time, white flocks appear in the solution, and then gradually collect at the surface of the liquid. Gum tragacanth, as well as dextrine and glue, show this very characteristic reaction only in the slightest degree, and such quantities of these substances which may be present as impurities carried over by imperfect separations, remain dissolved in the clear blue solution.
3. To confirm the presence of albuminoids, the water insoluble matter from Paragraph 2 above, is treated as follows:
   (a) Perform Procedure 3 on a portion.
   (b) A confirmatory test consists of the following: Another portion of the water insoluble residue, drained as well as possible from water, is treated with a mixture of one volume of concentrated H_2SO_4 and two volumes of glacial acetic acid. In the presence of albumen, a reddish violet color develops gradually; warming hastens the reaction.

Water Repellents

I. Non-Durable Type

This type of product is usually an aqueous emulsion containing wax or a mix-

ture of waxes in the dispersed phase and hydrophilic colloids, emulsifying aids, and polyvalent metal salts in the continuous phase. The method of analysis is usually quite simple and the following procedure will generally suffice.

A. To determine the nature of the colloidal stabilizer, perform Procedures 2 and 3 on the product directly; the other ingredients present will ushually not interfere with these tests.

B. A fresh portion of the sample should then be dispersed in 1% HCl solution, and then heated to the boil. This treatment will often break the emulsion. If not, the solution should be heated under reflux until the emulsion breaks. In any case, after breaking the emulsion, the mixture is extracted with petroleum ether.

(1) The ether solution is washed until neutral to methyl orange and then warmed until the solvent has evaporated. The ether-soluble residue should be tested for its melting point, crystallinity (9), acid value and saponification value, Zero acid and saponification values indicate that only petroleum wax is present; the degree of crystallinity indicates the presence of crystalline vs. microcrystalline waxes or mixtures thereof; a substantial acid value indicates the presence of fatty acids, and a substantial saponification value indicates the presence of saponifiable vegetable, insect, or mineral wax.

(2) The aqueous layer (after ether extraction) is made alkaline with ammonium hydroxide. The gelatinous precipitate which forms is filtered off, washed with water and then taken up with dilute HCl. This solution is tested for Aluminum and Zirconium in the following way:

To one portion of the solution add 1-2 cc. of 0.1% solution of freshly filtered Aluminon reagent. In the presence of Aluminum and/or zirconium a finely divided red precipitate will form. To this solution add 1-2 cc. of 3N ammonium carbonate, and then make solution alkaline with ammonium hydroxide. In the presence of aluminum a pink gelatinous precipitate remains. In the presence of Zirconium alone, the solution becomes completely decolorized, leaving only a white (or faintly yellowish) gelatinous precipitate. Obviously, Zirconium may not be detected by this test in the presence of aluminum. To another portion of the solution add an equal volume of conc. HCl and then add 3-4 drops of a 10% solution of trisodium phosphate. The solution is then heated nearly to the boil and then allowed to stand. In 1-2 minutes, a well-defined gelatinous precipitate will form if zirconium is present. No other common elements interfere with this test (4).

C. A fresh portion of the sample should be carefully evaporated to dryness and then ground to a fine powder. If saponifiable matter has previously been found present it should be removed by extraction with warm petroleum ether. The ether insoluble matter is warmed until free of solvent and then it is extracted with methanol. In the methanol solution will be found any synthetic surface active agents and these may be analyzed according to procedures previously described for such compounds.

Note that such surface active agents, if they are present at all, are present only in very small quantities, and great care must be exercised in their isolation (21).

D. A fresh sample of the product (75-100 g.) is dispersed in 100 cc. of 3N H_2SO_4 and the mixture is distilled until 110 cc. of distillate is collected. This distillate is tested for Ducleaux Number by redistillation under standard conditions (*17*). The nature of the volatile acid may be determined by this procedure.

II. Semi Durable Types

This type of product, in the United States, generally consists of two components which are mixed by the finisher just prior to use. One component is usually an aqueous emulsion containing a wax or a mixture of waxes in the dispersed phase, and the other component comprises an aqueous solution of specially prepared, thermally unstable, polyvalent metal salts.

A. Analysis of the emulsion may be conducted as follows:

1. Perform Procedures 2 and 3 to determine the presence and nature of any hydrophilic colloids which may be present.
2. Determine the acid, and saponification values and total alkalinity, and recalculate these figures on the basis of the solids present. (It may be well to point out here, that water soluble salts of certain polyacrylic type compounds have been suggested as emulsifying agents for this type of emulsion; therefore, an unusually high acid value, total alkalinity, or the sum of both, may indicate the presence of this type of compound.)
3. A fresh sample should be treated with acid to break the emulsion, and the mixture should then be extracted with ether. The ether extract is washed until neutral to methyl orange and then warmed to drive off the solvent. If appreciable acid, saponification, or alkalinity values were obtained in Paragraph 2 above, the ether soluble matter should be saponified and the fatty acids separated from the unsaponifiables. The fatty acid may be identified in the conventional manner by the determination of acid value, melting point and iodine value. The unsaponifiable matter may then be subdivided, if necessary, by extraction with methanol: fatty alcohols being soluble and hydrocarbons being substantially insoluble. These subdivided fractions are then readily identified.

B. The organo-metallic salt solution may be analyzed according to the following:

1. One portion of the sample should be analyzed for inorganic cations, particularly aluminum, zirconium and chromium. (The presence of the first two may be determined on the sample directly by the procedures outlined under Paragraph I-B-2 above.)
2. The nature of the volatile acid may be determined by following the technique described in Paragraph I-D above.
3. Consideration should also be given to the possible presence of certain non-ionic, water soluble, synthetic polymeric type compounds which may be added as colloidal stabilizers.

III. Durable Type

There are several durable water repellent type compounds which are commercially available in the United States at the present time. These include, in the order of their importance, fatty chloromethylated quaternary type compounds, emulsifiable fatty nitrogenous type compounds and synthetic polymeric drying-oil type compounds. The author's personal experience in attempts to analyze known samples of the various types has led usually to highly inconclusive results.

TABLE IV—Properties of Durable Type Water Repellents

	Quaternary Type	*Emulsion Type*	*Drying Oil Type*
Appearance	Tan or gray pastes or powders	White to tan pastes	Viscous Emulsions
Odor	Tertiary Amines; organic solvents	Organic solvents; ammonia	Linseed oil; Castor oil
5% Solution in Water..	Clear to opalescent	Emulsion, or may be insoluble	Emulsion, or may be insoluble
5% Solution in 1% NaOH	Coagulates	Emulsion	Emulsion
pH of 5% Aqueous Solution	2-5	7-12	7-12
Elementary Analysis			
Nitrogen	Present	Present	Usually absent
Halogen	Present	Absent	Absent
Test for Formaldehyde (Procedure 13)	Present	Usually present	Usually absent

This may be explained by the fact that the manufacturing processes in all cases so alter the starting materials that little, if any, information of value may be obtained by ultimate analysis of the finished material. However, there is sufficient distinction between the various types so that a conclusion may at least be drawn regarding the general nature of the product. A summary of the pertinent data is included in Table IV.

Acknowledgments

Grateful acknowledgment is made to Sidney Goldstein who developed several of the test procedures which were included, and to Raymond A. Pingree for his helpful corrections of the manuscript.

References Cited

(1) "Allen's Commercial Organic Analysis", Vol. I, pp. 407-427, 4th Ed., Philadelphia, Pa., Blakiston's Son, 1909.

(2) "American Association of Textile Chemists and Colorists, 1942 Year Book", pp. 353-357, New York, Howes Publishing Co., 1942.

(3) Bradley, T. F., "Methods for Detection and Identification of Synthetic Resins", Ind. Eng. Chem., Anal. Ed. *3*, 304 (1931).

(4) Blitz and Mecklenburg, "Qualitative Estimation". Z. Angew. Chem. *25*, 2110.

(5) Davidson, D., "Hydroxanic Acids in Qualitative Organic Analysis", J. Chem. Education, *17*, pp. 81-84 (1940).

(6) Ellis, C., "The Chemistry of Synthetic Resins", Vol. II, pp. 1256-1264, New York, Reinhold Publishing Corp., 1935.

(7) Hawkins, W., Smith, D. M., and Mitchell, J., "Analytical Procedures Employing Karl Fischer Reagent XII. The Determination of Primary Amines", J. Am. Chem. Soc. *66*, 1662-1663 (1944).

(8) Jones, J. H., "Preparation of Alkanolamine Hydrochlorides", J. Assoc. Official Agr. Chem., *27*, 467-472 (1944).

(9) Kinsel, A., and Phillips, J., "Method for Classification of Petroleum Waxes", Ind. & Eng. Chem., Anal. Ed., *17*, 152-156 (1945).

(10) Kolthoff, L. M., and Furman, N. H., "Volumetric Analysis" Vol. II, pp. 167-169, New York, John Wiley & Sons, Inc. (1929).

(11) Ibid., pp. 158-160.

(12) Linsenmeyer, K., "Qualitative Differentiation of Wetting Agents and Detergents", Melliand Textilber, *21*, 468-469 (1940).

(13) Marron, T. U. and Schifferli, J., "Direct Volumetric Determination of the Organic Sulfonate Content of Synthetic Detergents", Ind. & Eng. Chem. Anal. Ed., *18*, 49-50 (1946).

(14) Rabold, C. N., "Plastics Survey", Textile World, pp. 93-98 (1945).

(15) Shaw, T. P. G., "Systematic Procedure for Identification of Synthetic Resins and Plastics", Ind. & Eng. Chem., *16*, 541-549 (1944).

(16) Shriner, R. L. and Fuson, R. C., "The Systematic Identification of Organic Compounds" pp. 112-116, New York, John Wiley & Sons, Inc., 1940.

(17) Ibid: pp. 120-121.

(18) Smith, D. M., Mitchell, J., and Hawkins, W., "Analaytical Procedure Employing Karl Fischer Reagent X. The Determination of Aliphatic Hydroxy Amines (Amino Alcohols)", J. Am. Chem. Soc. *66*, 715-716 (1944).

(19) Snell, F. D. and Biffen, F. M., "Commercial Methods of Analysis", pp. 496-501, New York, McGraw-Hill, 1944.

(20) "Textile Analysis" pp. 194-196.

(21) Hoyt, L. F., "A Qualitative Method for Detecting Surface Active Agents", J. Am. Oil Chem. Soc., XXIV, 54-55 (1947).

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Aging Cabinets—

(Concluded from Page 628)

with the most intense rays emanating from the light source. Hence, the FDA instrument was substituted.

A later report shows that acceleration as well as reasonable control of the light test for fabrics may be accomplished by the use of the cabinets as described herein, using a higher temperature and humidity in atmospheres of air and of oxygen.

Conclusions

This paper describes the construction and standardization of aging cabinets which may be used in conjunction with the Fade-Ometer. The cabinets provide a suitable means of controlling aging conditions; and they make it possible for future investigators to expose fabrics to light in different atmospheres; to expose fabrics which previously have been saturated with perspiration; and to combine light treatment alternately with abrasion, laundering, and drycleaning treatments. The cabinets utilize a sufficiently large specimen of fabric to permit numerous observations for strength, fluidity, and color change to be made following one operation.

Acknowledgments

The author is indebted to the American Viscose Corporation, who support the Research Fellowship at The Pennsylvania State College, which made it possible to undertake this study.

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Acknowledgment is made of the invaluable suggestions of Dr. George H. Fleming, Associate Professor of Chemistry, of the school of Chemistry and Physics at The Pennsylvania State College for help and advice in designing the accelerating aging cabinets. Recognition is given to D. C. Duncan, Professor of Physics, The Pennsylvania State College, for suggesting the method of determination of total energy and for loan of the equipment for measurement of same; and to William Appel and Herbert Launer of the National Bureau of Standards for suggestions on the use of Calibration Paper B, and for supplying same.

This is the first in a series of reports on the accelerated aging of textile fabrics in controlled light exposure tests.

Bibliography

(1) Appel, William D. and Jessup, D. A., Accelerated Aging Test for Weighted Silk. Research Paper R. P. 855, Journal of Research, National Bureau of Standards, 15: 601 (1935).

(2) Chapman, E. N. A Study of the Changes In Strength and in Certain Chemical Properties of Textile Fabrics During an Accelerated Aging Treatment. Doctor's Dissertation, The Pennsylvania State College (1941).

(3) Corning Glass Works, Glass Color Filter Catalog, Corning, New York (1946).

(4) Hunter, R. S. Photoelectric Tristimulus Colorimetry With Three Filters, U. S. Department of Commerce, National Bureau of Standards, Circular C429 (1942).

(5) National Bureau of Standards, Calibration of Arc Lamps for Testing Colorfastness to Light, Circular Letter L. C. 785.

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• Symposium on pH Measurement

The seven technical papers and discussion comprising this Symposium are intended to present the latest theory and practice on colorimetric and potentiometric methods for making pH and closely related measurements. The Symposium was organized by A.S.T.M. Subcommittee XIII on Hydrogen Ion Determinations. Four broad topics are covered: a history of the field; a discussion of fundamentals and the broad theoretical basis of pH determinations; recent advances in the principal methods and techniques; and applications to particular fields.

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November 3, 1947

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Complete Details regarding the Chicago Convention will be published in the near future

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Fall Meeting, Piedmont Section

THE Fall meeting of the Piedmont Section was held at the Hotel Charlotte in Charlotte, N. C., Saturday, October 4, 1947.

The meeting was opened with a luncheon at 1:00 P.M. Saturday afternoon due to a conflict with a football game Saturday night. Following this luncheon, a short business session was held at which time the new officers for 1948 were elected. C. Norris Rabold, National Vice President spoke briefly on "Pride." He enumerated the accomplishments of the Piedmont Section and reminded us that we should be extremely proud of our record.

A technical session was held at 3:00 P.M. at which time Dr. H. W. Stiegler, Director of Research, spoke on the "Accomplishments of our Research Program." Dr. Stiegler congratulated the association on the progress it had made in research, but advised us that much could be done in the future and that we had just scratched the surface.

A meeting of the outgoing and incoming officers was held at 5:00 P.M. The evening was given to a very exciting football game between N. C. State College and Davidson. State College won by a

score of 14-0. Much interest was shown in this game due to the fact that a great number of the members attending the meeting were State College graduates.

The following members were elected officers for 1948:

John B. Neely, *Chairman*
Burlington Mills Corp.
Burlington, N. C.
P. E. Smith, *Vice Chairman*
Riegel Corp.
Ware Shoals, S. C.
Robert H. Smith, *Secretary*
Melrose Hosiery Mills, Inc.
High Point, N. C.
Edwin A. Briggs, *Treasurer*
Southern Franklin Processing Co.
Greenville, S. C.
Arthur R. Thompson, *Custodian*
Ciba Co., Inc.
Charlotte, N. C.
Sidney M. Cone, *Councilor*
Proximity Print Works
Greensboro, N. C.
Leland G. Atkins, *Councilor*
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Allied Chem. Corp.
Charlotte, N. C.
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General Dyestuff Corp.
Greenville, S. C.
M. M. McCann, *Sectional Committee*
Warwick Chemical Co.
Burlington, N. C.
C. F. Gibson, *Sectional Committee*
Southern Dyestuff Corp.
Charlotte, N. C.
Charles B. Ordway, *Sectional Committee*
Burlington Mills Corp.
Greensboro, N. C.

Approximately 225 attended the meeting.

Respectfully submitted,
R. H. SMITH, *Secretary*

—♦ ♦—

Opening Fall Meeting, N. N. E. Section

THE opening fall meeting of the Northern New England Section September 26, 1947 was opened by greetings from the Chairman, George O. Linberg, to a group of 150 members and guests at the Andover Country Club, Andover, Mass.

After complimenting the Dining Committee headed by Edward B. Bell, he announced the following nominating committee: *Chairman*, Kenneth Fox, Roland Derby, Hyman Selya, Clarence Nutting and Thomas Shoesmith. They were to report at our next meeting on November 21st, which will be held at the Hotel Manger in Boston at which time Dr. J. Harris of Dayton will speak on detergents.

The announcement of the Chicago section inviting us all to the National Convention to be held there October 23, 24 and 25 was read and it was noted that about forty-five to fifty had already signified their intention of going to this convention from the Northern New England Section. The Transportation Committee, headed by Ralph Hale, was thanked for the excellent job they had done.

Edward Chapin then introduced a motion which was passed after some comment and discussion, as follows:

1. That the Northern New England Section of the American Association of Textile Chemists and Colorists establish a Scholarship Fund.

2. That it set aside $1,000.00 from the Sectional Treasury as an underwriting of the fund.

3. That it appropriate $250.00 for a Scholarship at the Lowell Textile Institute for the School year, 1948-1949.

4. That it authorize a Scholarship Committee composed of the President and Dean of the Lowell Textile Institute and the Chairman and Vice-Chairman of the Section to select the recipient of the Scholarship.

5. That the award be announced and presented at the meeting of the Section at Lowell in May, 1948.

6. That the Secretary be instructed to notify the National Secretary of the vote on this motion.

It was then stated that the $1,000.00 was to be set aside as a sinking fund but that the section would raise the $250.00 for the scholarship each year by various means, including any contributions that the members may wish to give.

It was also announced at the meeting that the Constitution and By-Laws Committee would send out to each member a mimeographed copy of their work and a post card in addition for voting for the acceptance or rejection of this Constitution and By-Laws for the local section, and a space provided for any suggested amendment.

The Chairman then turned over the meeting to the Vice Chairman, Frank O'Neil, who introduced the speaker, Dr. George Wald of the Harvard Biological School. He gave a very interesting paper on the chemical aspects of color vision. This paper will be published in the American Dyestuff Reporter in a later issue.

The following were seated at the head table:

Dr. H. C. Chapin, National Secretary.
E. S. Chapin, NNE Councilor.
Prof. E. E. Fickett, Lowell Textile Institute.
John N. Dalton, National Vice-President.
George O. Linberg, NNE Chairman.
Dr. George Wald, Speaker.
Frank J. O'Neil, NNE Vice-Chairman.
Simon Williams, Dean, Lowell Textile Institute.
Prof. John H. Skinkle, Lowell Textile Institute.
C. Wendel Lever.
Azel Mack, NNE Secretary.
H. E. Wieland, NNE Chairman of Publicity.

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

47-35

Education: B.S. in Textile Chemistry, North Carolina State College, 1947.

Experience: Analytical chemist, construction and operation of water purification plants, pulp and paper manufacture including bleaching; Navy technician. Age 25; single; references.

47-36

Education: University graduate.

Experience: Consumer relations and textile laboratory management.

Age, 37; single; references; will consider any location.

47-37

Education: Lowell Textile Evening School.

Experience: Dyer, variety of fibers, asst. foreman.

Age, 30; married; references.

CALENDAR

PHILADELPHIA SECTION
Meetings: November 8 (Silver Anniversary Meeting, Bellevue-Stratford Hotel, Philadelphia); January 9, 1948, February 27, April 9, May 14 (Kugler's, Philadelphia).

NORTHERN NEW ENGLAND SECTION
Meeting: November 21.

NEW YORK SECTION
Meeting: December 5 (Swiss Chalet, Rochelle Park, N. J.).

SOUTHEASTERN SECTION
Meeting: December 6 (Atlanta, Ga.).

ABSTRACTS
FROM CONTEMPORARY JOURNALS

Blocks for Hand Block Printing

Textile Mercury and Argus, page 245, Vol. CXVII, No. 3046, August 22, 1947.

Although screen printing has developed rapidly and is widely used there still remains a large market for block printed high quality materials such as ties, handkerchiefs, dressing gown fabrics, etc. Block printing is particularly applicable where short printing runs are required and when designs are intricate and fine.

Materials used for the making of hand printing blocks are wood, such as pear or sycamore, copper for strips and pins, cast metal shapes and wool or rabbit fur felt.

The six main types of printing blocks are: (1) plain wood, (2) wood and felt, (3) wood with copper or brass strips, (4) wood with copper and felt, (5) wood with cast metal shapes, and (6) wood with cast metal and felt.

The above types of blocks are discussed with relation to their construction and use.

A method for the transference of the design to the block is given along with necessary block cutting precautions and recommended procedures for this operation.

Mercerization

Michael Grahame, Textile Mercury and Argus, page 242, Vol. CXVII, No. 3046, August 22,1947.

The mercerization of cotton results in a yarn shrinkage of from 10 to 25 percent. The tensile strength will increase from 10 to 40 percent. Applying tension to cotton yarn during mercerization prevents shrinkage which increases the yarn's affinity for dyestuff. Yarn treated in this manner and not dyed will have a pleasing luster.

Hank mercerizing machines, utilizing reversing rollers to maintain tension, can complete one operation in a matter of minutes. Piece goods are usually allowed to shrink when treated with caustic soda and then stretched back to the original dimensions before washing.

The optimum concentrations and temperatures of the caustic soda used for mercerization are 50-60° Tw. and 60-65° F, respectively.

Both yarns and piece goods should have a pre-mercerization treatment of boiling-out to assist the wetting-out of the material in the caustic soda and to insure a uniform mercerizing effect.

Several tests for differentiating between mercerized and unmercerized cotton are included.

Wool Dyeing Assistants

S. Yates, Textile Recorder, Page 50, Vol. LXIV, No. 769, April, 1947.

In the application of acid and chrome dyes, Glauber's salt retards the rate of dyeing and causes a levelling effect. This effect is shown in the following equation:

(Wool) H_2SO_4 + 2(Dye-So Na)⇌
(Wool) $(Dye\text{-}SO_3H)_2$ + Na_2SO_4

In the above equation "wool sulfate" reacts with the sodium salt of the dye-acid liberating free sodium sulfate and allowing the dye-acid to combine with the wool fiber. Since this reaction is reversible it can be seen that an excess of Glauber's salt will retard the rate of dyeing.

Chrome mordanting by three methods: (1) sweet chrome, (2) sour chrome and (3) reduced chrome, is discussed and comments made on the function of the dyeing assistants used in each method.

The reduced chrome method of mordanting is probably the most satisfactory. However, since it requires the use of organic reagents, it is the most expensive.

The metachrome process which uses a mixture of potassium chromate (1 part) and ammonium sulfate (2 parts) is becoming increasingly popular. In this method the ammonium sulfate dissociates at high temperatures liberating ammonium hydroxide and sulfuric acid. The ammonium hydroxide concentration is reduced by its volatilization which in turn allows the sulfuric acid present to become more available to the wool fiber. The free dye-acid of the chrome dye is liberated by the sulfuric acid with a resulting combination of the dye-acid and the fiber. Potassium bichromate is formed by a reaction between the potassium chromate and some of the sulfuric acid as follows:

$$2\ K_2CrO_4 + H_2SO_4 \rightarrow K_2Cr_2O_7 + K_2SO_4 + H_2O\ .$$

Any ammonium chromate present is similarly transformed and normal mordanting proceeds. Easily dissociated ammoniacal salts such as ammonium acetate and mono-ammonium phosphate may be substituted for the ammonium sulfate in the metachrome process. Bichrome may be used in place of chromate but requires an alkaline bath before the dyeing operation to form potassium and ammonium chromate. In this case, with the addition of ammonium sulfate an equivalent metachrome mordant is obtained.

Preserving the Life of Printers' Blankets

Textile Recorder, page 52, Vol. LXIV, No. 769, April, 1947.

The essential features of a printing foundation are that it must be: (1) solid, (2) continuous and (3) resilient. Resiliency is accomplished by the use of a specially woven cotton fabric to form an endless, waterproofed, blanket which must be washable and offer minimum shrinkage. These blankets are protected on the printing foundation by the use of a back-grey or grey-cloth of unbleached cotton which will absorb surplus print paste.

The blankets must be washed to retain resiliency, preserve the surface and to avoid creases and cracks.

Soiling of the blanket occurs when the back-grey material is penetrated and through marginal accumulations of the print paste. Some types of print pastes soil more quickly than others and soiling from these types is usually more difficult to remove.

The continual washing of blankets with the equipment provided on the machine for this purpose is objectionable in that quick drying of a moist blanket is difficult. However, in certain instances this equipment, with modifications, can be used. An example of this application is given in which chrome mordant dyestuffs thickened with starch and British gum is the print paste.

Hand washing of the blankets with hot soapy water applied at each side with cloth pads will remove non-hygroscopic print pastes. However, soiling of the drying cylinders usually occurs. Marginal soiling may also be removed by the use of doctor blades and hot soapy water.

A two roller method for washing printers' blankets is described and discussed.

The most successful washing is accomplished by spreading the blanket on a concrete floor and using hard-bristle sweeping brushes to apply hot soapy liquor. Complete details are given for cleansing in this manner.

Moisture retention and other faults and imperfections of printers' blankets are discussed and means of overcoming these are given.

• PATENT DIGEST •

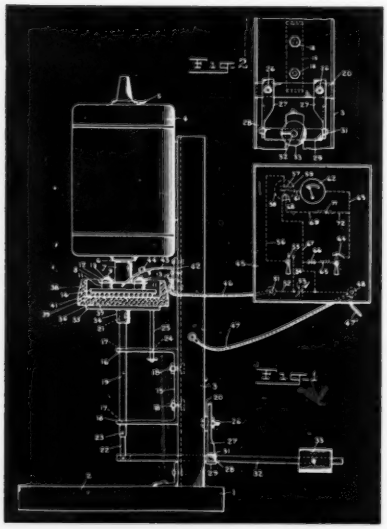
Static Electricity—Measuring G, 1

U. S. Pat. 2,412,430. (Celanese Corp., Ott, June 3, 1947).

A device for measuring the static charges of electricity accumulated by various textile treatments is described. It is known that static electricity is generated by a frictional contact of a moist fiber mass with a metal surface. In most of the textile treatments the static electricity development is very troublesome: certain portions of the textile material happen to adhere to the machine parts and fly away from other metallic parts, repelling each other. Numerous finishes have been proposed to decrease or to eliminate these electric charges. It is the purpose of the present invention to measure the effect of these finishing agents by placing a sample (41) in a cup (38) and letting it rotate for a definite number of revolutions. During this rotation the sample is pressed against an insulated plate (14) which can be made of iron, copper or any other substance with which the fibers are in contact in practice. The pressure is held constant by a balance weight fixed on a certain point of the balance lever (32). A microammeter is connected with this instrument by two wires. One of them (47) has contact with the metal rod (3) of the stand. The other one (46) leads to a contact plate (41) insulated from the stand. After rotating the sample in the manner set before, the cup (41) is pressed downward and the sample is thus no more in contact with the plate (14). Thereupon the contact finger (43) is pressed down using the insulated key (44). The amount of static electricity, accumulated on the fabric shows immediately on the ammeter. The effect of anti-static finishing agents can be measured by comparison with blanks or with finished material having a known degree of anti-static property. Figure 2 illustrates the apparatus enclosed in a transportable box.

Reference cited by the Patent Office among others: U. S. Pat. 2,166,385 (Behr-Manning): testing static charges by determining the time required by a sample for falling under the influence of gravity.

Static Electricity—
U. S. Pat. 2,412,430



PAUL WENGRAF

Carboxy Alkyl Cellulose — hardened with Zirconium compounds G, 2, 01

U. S. Pat. 2,420,949 (Rohm & Haas, Hager, Bock, May 20, 1947).

This process relates principally to the preparation of fibers, masses, films and the like but it can probably be applied as well to finishing textiles in analogy to the cellulose methyl ether ("Tylose" or "Colloresin") finishes. Two methods of preparing carboxy alkylcellulose ethers are known: the specification uses the process described in U. S. Pat. 2,349,797 (Rohm & Haas, Bock-Houk) consisting of reacting alkalicellulose with acrylonitril (CH_2 : CH-CO . CN)*. The present patent suggests to use the alkali soluble, water insoluble substance, obtained by this condensation as a sizing agent. In spinning the thus prepared alkaline condensate in a zirconium bath the filament is rendered insoluble. In the same way it might be possible to precipitate the carboxyalkylcellulose when applied in an alkaline solution as a finishing agent and by subsequent treatment in an appropriate acid zirconium salt bath the material might become permanently water repellent.

References cited by the Patent Office are amongst others:

U. S. Pat. 2,332,048 (Rohm & Haas): ***water-soluble*** carboxy ethyl cellulose ethers are prepared by condensing alkali cellulose with acrylonitrile and etherifying the condensate.

U. S. Pat. 2,331,859 (Dow Chem.): thickened solutions of cellulose glycolates are *not* precipitated by treating them with moderate amounts of aluminum sulfate.

U. S. Pat. 2,236,545 (du Pont): describes a method for purifying carboxyethylcellulose by preparing the product in the known way from alkali cellulose + chloroacetate, neutralizing the product carefully with hydrochloric acid in methanol and suspending the product in water, thus producing a gel.

The zirconium compounds are quite generally used as waterproofing agents. U. S. Pat. 2,328,431 and 2,316,057 (Gen. Aniline) describe water repellent finishes on alkali pre-treated cellulose fabrics by impregnating them with a wax combined with zirconium salts. U. S. Pat. 2,191,982 (I. G. Farbenindustrie A.G.) recommends for the same purpose salicylic acid esters of higher fatty alcohols mixed with zirconium compounds. U. S. Pat. 2,402,857 proposes a one-bath treatment with aqueous colloidal solutions of zirconyl soaps (see abstract to the last quoted patent in AMERICAN DYESTUFF REPORTER 1946 p. 719).

Flocking Device D, 4

U. S. Pat. 2,425,236 (Kenlea Mfg. Co., Ferrante, August 5, 1947).

The present specification relates, as said in the preamble, to a method and an apparatus for flocking open mesh material. The flocked products can be used for different purposes as for instance for camouflage material for woven wire screens and the like, but also obviously for open mesh textiles. The flock is directed by gravity to the mesh to be covered. It is applied in such quantities that there is an excess of flocking material which adheres partly to the adhesive spread over the mesh while another portion falls through the interstices upon a support such as a belt conveyor. This support is kept in constant motion by the movement of beaters which propel the flock falling through the interstices of the mesh and drive them against the back of the mesh so that also the backside is tightly covered with flock giving the material a velvet-like appearance. (A schematic illustration of a single wire, covered with flock can be seen in Fig. 3). The strip of open mesh (metal—or textile screen, 11) is led between rollers

*The other process consists of reacting chloracetates with alkalicelluloses.

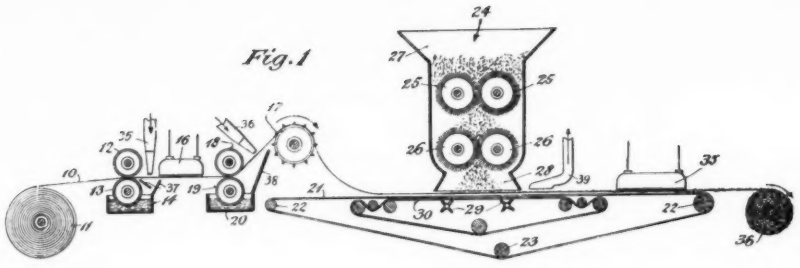


Fig. 1

Flocking Device—
U. S. Pat. 2,425,236

Fig. 3

(12, 13) which transfer some cementitious liquid from tank (14). An infrared lamp (16) has to set the cement in order to keep the threads to the mesh in a definitely fixed position.

Thereupon the web is passed through another tank (20) containing the adhesive for fixing the flock, strewn during the next operation's step from (24) over the web's surface. The other operations such as drying (infrared lamp 35) and rolling up (36) are self explanatory. The principal feature of this invention may be seen in the above mentioned action of the beaters (29) which have not only to propel the flock against the underside of the mesh but also cause any flock loosely held within the interstices of the fibers to fall therefrom. Thus the invention is rather a device for producing velvet imitations than one of the usual flock printing devices.

References cited by the Patent Office are amongst others:

U. S. Pat. 2,349,153 (Kenlea Mfg. Co.): the flock printing apparatus is characterized by coating the support with rubber cement and applying the flock whereupon the excess is sucked away.

U. S. Pat. 2,351,266 (Collins & Aikman): describes the distribution of flocks in an electrostatic field. The fibers are oriented in erect position by mutual repulsion.

U. S. Pat. 2,338,499 (Nat. Automotive Fibers): rugs are manufactured in a flock printing process by vibrating the cemented fabrics on three different places and feeding fibers to this previously cemented surface.

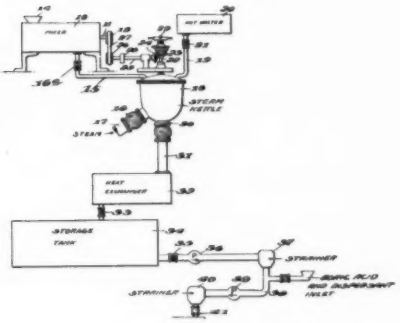
See also Abstracts to Brit. Pat. 573,855 in AMERICAN DYESTUFF REPORTER, 1946, page 376.

Sizing with liquid starch mixtures A, 4, 01

U. S. Pat. 2,424,050 (A. G. Pecker, E. A. Pecker, J. S. Pecker, July 15, 1947).

The present patent has the purpose to provide a new method for use in sizing, laundering and the like. The principal object of the invention is to avoid lumpiness and to give the starch dispersion uniform dispersing power and resistance to bacteria. The process consists of adding pine oil and boric acid as antiseptic agents and aging the starch dispersion thereupon to form a gel. This gel is broken into fine particles whereby pine oil and boric acid are distributed uniformly within the starch paste. It is known, as stated in this specification, that sodium fluoride can be added to a starch mixture and pine oil be used as a dispersant (U. S. Pat. 2,228,784)—Spilka). Now it has been discovered that pine oil acts as an effective antiseptic so that sodium fluoride can entirely be omitted. Furthermore in adding a blueing agent as usual, it is a known fact that starch mixtures absorb oxygen from the blueing agent, destroying gradually the blue dyestuff. In carrying out the invention a cold mixture of thin boiling starch and water is mixed with hot water and boiled. The boiling process kills some but not all of the bacteria and in cooling this mixture new bacteria may pollute the fresh formed starch gel. Therefore, pine oil and boric acid are mixed to the still liquid mass and the composition is allowed to age in a tank for 24-72 hours whereby gelation occurs. After this time the mass is subjected to an energetic straining action while adding new amounts of pine oil (15 g. per gallon) and boric acid (10-20 g. per gallon of the composition). The straining operation is repeated and further amounts of pine oil and boric acid are charged into the mixture. The process can easily be understood from the illustration enclosed here.

Sizing—
U. S. Pat. 2,424,050



Reference cited by the Patent Office amongst others:

U. S. Pat. 2,235,573 (Stein, Hall & Co.): describing an apparatus for automatic controlled starch conversion.

Pine oil is usually added to starch dispersions to avoid foaming of printing pastes or sizes (see for instance Brit. P. 383,293, Imp. Chem. Ind.).

The wetting and dispersing action of Terpineol has also been described in U. S. Pat. 2,073,464 (Hercules Powder) but none of these references suggested using pine oil or the like as an antibacterial.

—◆ ◆—

• Dispersing Agent SS

Full details on the manufacturing process for "Dispersing Agent SS", produced by the I. G. Farbenindustrie in Germany for use as a dispersing agent in the manufacture of Celanese and vat dyes are contained in a report now on sale by the Office of Technical Services, Department of Commerce.

Orders for the report (PB-57500; Dispersing Agent SS, I. G. Farbeindustrie, Hoeschst mimeographed, 25c) should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

• Bristol Catalog

The Bristol Company, Waterbury, Conn., has just published a 16-page Bulletin, No. T835, on its recently announced line of Series 500 Recording Thermometers and Gauges. The new bulletin gives detailed information in the form of descriptions and pictures of the new instruments. Complete information covering chart ranges, chart drives, thermometer bulbs, and measuring elements is also given.

Book Reviews

Encyclopedia of Hydrocarbon Compounds: Volume II C_6 and C_7

Compiled by Joseph E. Farriday, Ph. D. Research Chemist, Calico Printers Association, Ltd. Loose-Leaf Cloth Binder. 6¾ x 9, 603 pages. Chemical Publishing Co. 1947. Price $17.50.

This is the second volume of this valuable reference book which previously covered C_1 and C_5 compounds. Two replacement and addition issues have already been made available in order to keep volume one up to date.

Volume II deals with compounds containing 6 and 7 atoms of carbon. New features include a comprehensive treatment of physical properties with references, the notation of methods which may be of special use for laboratory preparations, also an up to date list of journals.

Attention is particularly called to the completeness of the "Bibliographical References." For example, in Volume I there are 554 literature and patent references to methane; 439 to acetylene; 465 to ethylene; 251 to propylene; 319 to butadiene, etc. The references on preparation give the salient points of the method such as temperature, catalyst used, etc.

Another unique feature of this encyclopedia is the includion of data on free radicals; also on hydrocarbons containing heavy hydrogen and the carbon isotrope 13.

This Encyclopedia of Hydrocarbon Compounds will prove of great value to every research chemist dealing with organic chemistry, as well as many other chemists who have to deal with organic compounds both in the laboratory and in the works.

The Theory and Practice of Wool Dyeing

By C. L. Bird, M. Sc. F.R.I.C. Lecturer in Dyeing at the University of Leeds, 207 pages, 58 figures, published by Society Dyers and Colourists, 32 Piccadilly, Bradford, England.

The author, who is a lecturer in dyeing at the University of Leeds, states that most of the contents of this book was originally published between 1942 and 1945 as a series of articles in the Textile Recorder. The material has been brought up to date, and the author is now indebted to the Society of Dyers and Colourists for publishing the revised and expanded version of his manuscript in book form.

The author, being an experienced lecturer, has presented the whole subject of wool dyeing in a direct and lucid manner, and it may well be accepted as a thorough text book upon the subject. While the author states that he has omitted the subject of cloth finishing he has gone into such subjects as scouring, crabbing, bleaching and carbonizing which may have a decided effect one way or another on the dyeing process.

Especially complete is the section on union dyeing, discussing not only the dyeing of cotton and wool union material but also combinations of wool with most of the man made fibers. The information given should help the dyer materially in the production of solid, and uniform shades, as well as multi-color effects.

Textile auxiliaries and their usefulness to the dyer is discussed, also water and its impurities. Machinery is well described and well illustrated, and although of English make, is practically the same as American machinery in principle.

The scope of the book will be indicated by the titles of the eleven chapters.

I—Dyeing in Relation to Other Textile Processes.

II—The Theory of Wool Dyeing.

III—Wet Treatments Preparatory to or Associated with Dyeing.

IV—Acid Dyes.

V—Chrome Dyes.

VI—Neolan and Palatine Fast Dyes.

VII—Indigo.

VIII—Union Dyeing.

IX—Levelling and Stripping of Dyed Materials.

X—Water and Auxiliary Products.

XI—Machinery for Dyeing Wool.

Textile Fibers

By J. Merritt Matthews. Fifth Edition. Edited by Herbert R. Mauersberger with the assistance of a Staff of Specialists. 1133 pages, 319 figures and 335 tables. Published by John Wiley and Sons. Also sold by Textile Book Publishers. 1947. Price $12.50.

Knowledge, if it is fundamental and based upon fact, changes little over a period of years. J. Merritt Matthews did such an excellent job in bringing together the fundamental knowledge in regard to the textile fibers, that it is well that Mauersberger and his associates have revised and brought up to date the original book, rather than have added an entirely new and additional volume.

The textile industry is one of the largest, and surely one of the most complicated industries. More and more its success depends upon the application of scientific knowledge and research, both fundamental and applied. This new edition should be a great aid to all technical workers in the industry as a reference book regarding the properties of the textile fibers, their uses, methods of identification and testing, also their specific adaptability to different uses.

This new fifth edition constitutes the most complete volume on textile fibers available at the present time and should find a prominent place in every textile library.

Prospective Organic Coatings as Engineering Materials

By Joseph J. Mattiello. Edgar Marburg Lecture 1946. Presented before the Forty-Ninth Annual Meeting of the American Society for Testing Materials. 100 pages. 41 illustrations and 7 tables. Published by the American Society for Testing Materials. 1946.

This is the nineteenth in the series of Marburg Lectures and like all the others, it constitutes a valuable addition to the literature of science and industry.

While it is designated as a lecture it really is a treatise on the subject, and yet on the other hand the author was the Editor of Protective and Decorative Coatings in five volumes recently published by John Wiley and Son.

As the author states "The manufacture of protective coatings is finally emerging as an industrial science", and we might add that Dr. Mattiello, as much if not more than any one else, is responsible for its development.

The term "Organic Coatings" as used by the author includes such materials as varnishes, paints, enamels, lacquers (clear and pigmented), textile coatings, plastics and similar special coating materials.

Much of this lecture should be of direct interest and all of it in a general way to Textile Chemists. One cannot read this lecture, without being impressed with the broad extent, to which Modern life and industry are served by Organic Coatings.

TRADE NOTES • NEW PRODUCTS

• Second NETF Campaign

Abbot Stevens, Treasurer of M. T. Stevens & Sons Co. Division of J. P. Stevens & Co., Inc., North Andover, Mass. has accepted the general chairmanship of the New England Textile Foundation's second campaign to raise $250,000.00 for the benefit of the four textile schools in New England. The campaign started on October 22nd and will continue into the first half of 1948 until the required amount of money is raised. Capital, as well as income, will be used to give financial assistance to faculty members, to modernize school equipment and to award a limited number of scholarships to qualified students. The campaign organization, in addition to Abbot Stevens, is as follows:

Division Chairmen—*Massachusetts Textile Division*—E. Dean Walen, V. Pres., Worsted Division, Pacific Mills, Lawrence, Mass.; *Rhode Island Textile Division*—J. H. Axelrod, Gen. Mgr., Airdale Worsted Mills, Inc., 1 Main St., Woonsocket, R. I.; *Connecticut Textile Division*—J. W. Powdrell, Pres., Powdrell & Alexander, Inc., Danielson, Connecticut; *New Hampshire Textile Division*—G. K. Ripley, Pres., Troy Blanket Mills, Troy, N. H.; *Maine Textile Division*—Oliver Moses, 3rd, Pres., Worumbo Mfg. Co., Lisbon Falls, Maine; *Wool Dealers Division*—Hugh Munro, Pres., National Wool Trade Association, 263 Summer St., Boston, Massachusetts; *Yarn Dealers Division*—J. Charlton Craig, Treas., Mauney Steel Co., Providence, Rhode Island; *Dyestuffs & Chemicals Division*—Edwin H. Arnold, Pres., Arnold, Hoffman & Co. Inc., 55 Canal Street, Providence, Rhode Island; *Cotton Brokers Division*—W. K. Shaw, Jr., Pres., E. A. Shaw and Co., Inc., 128 Washington St., Boston 8, Massachusetts.

• Surface Active Agent HHS

Publicker Industries Inc., Philadelphia 2, Pa., announces the commercial production of a new detergent. It is an alkyl aryl sulfonate prepared in dry flake form.

Surface Active Agent HHS is claimed to be an excellent wetting, leveling, and foaming agent. It is stated that it is stable in hard water and will disperse calcium soap. Surface Active Agent HHS is said to have good emulsifying properties.

Surface Active Agent HHS is recommended by the manufacturer for use as an advantageous aid for wetting out, dye leveling, penetrating, emulsifying and scouring.

• Joins Sandoz

Walter E. Taylor, who has been appointed to the Department for Textile Chemicals, Sandoz Chemical Works, Inc., where he is engaged in research and development work connected with new chemicals to be marketed to the textile industries.

Mr. Taylor came to Sandoz from the American Viscose Corp., which he had joined following his honorable discharge from the U. S. Air Forces, after 18 months' service overseas. Prior to the war, he was for seevral years with the Pacific Print Works, Lawrence, Mass.

• Appointed Director of Education

P. A. Wells, M.A., M.Sc., F.C.C.S., A. Inst. P., General Secretary of the Society of Dyers and Colourists, has been appointed Director of Education in the International Wool Secretariat, London, as from October 1st, 1947.

• Technological Dictionary

Dictionaries, Inc., 501 Fifth Avenue, New York 17, N. Y., has announced that they will publish, under license of The Alien Property Custodian, a technological dictionary for industries consuming dyestuffs and textile auxiliaries (Fachwoerterbuch fur die Farbstoffe und Textilhilfsmittel verbrauchenden Industrien). This is a reprint of a German-English technical dictionary privately circulated by I. G. Farbenindustrie Aktiengesellschaft which has not previously been available to the general public. It consists of 489 pages and includes more than 20,000 terms. Pre-publication price is $10.00 and after publication the price will be $12.50.

• Joins ITT

Gordon H. Campbell has joined the staff of the Institute of Textile Technology to work in the organic chemistry division. He is a graduate of the University of Maryland, holding the degree of B. S. in Chem. Prior to coming to the Insttitue, Mr. Campbell was for 2½ years chief chemist at Kenwood Mills.

• Harris Research Appointments

The Harris Research Laboratories, Washington, D. C., announces the following appointments to the staff: as research associates, Herman Bogaty, physical chemist, formerly with the Textile and Paper Divisions of the National Bureau of Standards, and Richard W. Mattson, mechanical engineer, formerly with the Engineering and Research Corporation, Riverdale, Md.; as laboratory technician, Ruth Kirkwood, a graduate in chemistry of Mary Washington College, University of Virginia.

• Joins Philadelphia Quartz

The Philadelphia Quartz Company, 121 South Third Street, Philadelphia, Pa., who are manufacturers of silicates of soda, announces the addition of Albert C. Pierce to its sales staff. Mr. Pierce is soon to assume territorial duties in the Metropolitan New York area.

Discharged from the A.A.F. in January, 1946, Mr. Pierce was associated with the U. S. Government Geological Survey in Baltimore, Md., which conducted a survey of the underground water supply of that state. He joined the Philadelphia Quartz Company in August of this year and has completed technical training in the uses of silicates of soda in industry.

The company also announced that Everett W. Turley, previously sales representative in the New York area, has been transferred to Chicago with headquarters at the company's sales office, 205 W. Wacker Drive.

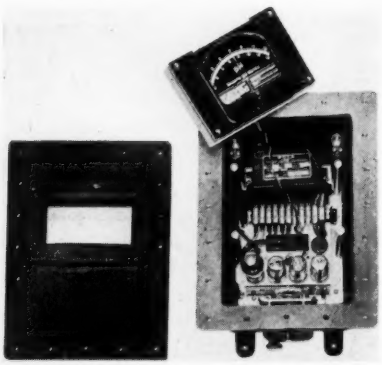
• General Manager, General Aniline

Jack Frye, President of General Aniline & Film Corporation, announced today the appointment of Chandler T. White as General Manager of the Gen-

eral Aniline Works Division of the Corporation. Mr. White, a chemist who joined the General Aniline staff in 1920, has been Plant Manager of the Corporation's Rensselaer, N. Y., plant. He will be in charge of the manufacture of synthetic dyestuffs, intermediates, textile auxiliaries and a line of specialties, including detergents.

• New pH Meter

The Macbeth Corporation, 227 West 17th Street, New York 11, N. Y., announces a new explosion-proof, line operated, direct reading, continuous indicating pH Meter.



Open view of the new Macbeth explosion-proof pH meter showing construction details.

Designed in accordance with Class 1, Group D requirements for use in atmospheres containing gasoline, petroleum, ethyl alcohol and acetone, the instrument is provided with a connection for operating a recorder at a remote position. Further information on the Macbeth explosion-proof pH Meter may be obtained by writing the Macbeth Corporation.

• Nopco Booklet

A new edition of its interesting and informative booklet "Interpretation of Analysis for the Layman" has just been released by Nopco Chemical Company.

This 40-page booklet contains much information helpful to those working with industrial chemicals. Included is a well cross-referenced glossary of the terms most frequently used in analyzing surface active chemicals. Another chapter describes the common methods of analyzing such agents and how the analytical figures are used to deduce the composition of various materials.

Copy of "Interpetation of Analysis for the Layman" may be obtained without charge by writing to the Industrial Advertising Division of Nopco Chemical Company, Harrison, New Jersey.

• Coupling Compounds Available

The availability of commercial grades of phloroglucinol, methyl phloroglucinol, and triaminotoluene is announced by the Edwal Laboratories, 732 Federal Street, Chicago, Illinois.

These materials are said to be of value as coupling compounds in the development of fast black dyes. In dyeing certain synthetic fibers, for example, phloroglucinol is said to develop a dye with good fulling properties, good fastness to light and washing, and high tinctorial power which leads to economy in use. The pre-development wash is not always necessary when phloroglucinol is used to develop a black color.

Methyl phloroglucinol has many of the properties of phloroglucinol and can be produced more economically. It is stated that triaminotoluene is very soluble in water and may be coupled with nitro- and chloro-sulfo-aminophenols to produce good brown shades for dyeing wool.

A decrease in the price of the technical grade of phloroglucinol, which has been used for many years in the diazo-type field, has recently been announced.

• Booklet on "Ucon" Fluids and Lubricants

"Ucon" Fluids and Lubricants (Polyalkylene Glycols and Derivatives) is a new booklet recently published by the Special Products Division of Carbide and Carbon Chemicals Corporation, a Unit of Union Carbide and Carbon Corporation. This booklet discusses in detail the important properties and uses of several series of "Ucon" fluids and lubricants. These new materials are finding wide use in machine lubrication and in hydraulic applications, as well as in the textile, cosmetic, metal, leather, and rubber industries.

Copies of this booklet may be obtained from any office of Carbide and Carbon Chemicals Corporation. When requesting your copy, ask for Form 6500.

• Gurley Stiffness Tester

A bulletin describing the new Gurley motor-operated stiffness tester has been published by W. & L. E. Gurley.

The booklet illustrates how the stiffness tester can be applied in testing paper, textiles, leather, plastics, metal foil and finishings; its range and capacity and the standard size samples used.

Copies of the bulletin, No. 1430, are available on request to W. & L. E. Gurley, Troy, New York.

• St. Louis Solvay Manager

Solvay Sales Corporation has announced the appointment of Neal M. Draper as Manager of the St. Louis Branch. Mr. Draper, who has been a salesman in the St. Louis territory for the past 12 years, succeeds M. S. Johnson, who has been transferred to the Boston Office. Elmer Seener has been appointed Assistant Branch Manager of the St. Louis Branch.

The Solvay Sales Corporation handles sales of alkalies and chemicals manufactured by the Solvay Process Company. The Solvay St. Louis Branch covers the territory of Nebraska, south through Oklahoma and Arkansas and west through and including the Rocky Mountain States.

• Preliminary Report on Synthetic Organic Chemicals

The United States Tariff Commission recently issued a preliminary report on the 1946 production and sales in the United States of synthetic organic chemicals and their raw materials. This report gives separate data on raw materials, intermediates, and finished products. Finished products are grouped in the report according to use as dyes, lakes and toners, plastics materials, synthetic elastomers, plasticizers, rubber-processing chemicals, surface-active agents, flavor and perfume materials, medicinals, and miscellaneous chemicals. Statistics are given for each individual chemical whenever the data may be published without revealing the operations of individual companies.

The Commission's final report, which will be issued later, will contain complete data on these chemicals and in addition, it will contain a list of all chemicals included in the report identified (wherever possible) by producers.

Copies of the preliminary report may be obtained by writing to the Secretary, United States Tariff Commission, Washington 25, D. C., or from the Commission's office in Room 513 the Customs House, New York, N. Y.

• Calco Guest Speaker

Doctor James W. McBain, Professor of Physical Chemistry, Stanford University, was guest speaker at a meeting of the company research and technical staff of the Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J. Dr. McBain spoke on the subject "Solubilization". Prior to the meeting, Dr. McBain visited the extensive Calco laboratory facilities, including the Physical Chemistry, Microscopical, Organic and Inorganic Research Sectons, as well as the application and control laboratories.

Left to right: Dr. James W. McBain and Dr. M. L. Crossley, Director of Research, Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J.

Calco has sponsored a program of lectures for several years. Under this plan, many outstanding authorities in the field of industrial and academic research have been heard by the Calco research and technical staffs.

• New Monsanto Plant

Construction of a new unit to produce formaldehyde for expanded output of plastic resins has been announced by Monsanto Chemical Company's Plastics Division. Ground has been broken for the new unit at Springfield, Mass., and construction is expected to be completed in the second quarter of 1948.

• Joins ITT

Miss Edith Honold has joined the staff of the Institute of Textile Technology to work in the physical chemistry division. She holds degrees of B. A. from Sophie Newcomb College and M. S. in Chem. from Tulane University. She was with the Southern Regional Research Laboratory, working there in the physical chemistry section for 5 years.

• Carbon Tetrachloride Book

A new 32-page booklet "Carbon Tetrachloride Properties anl Uses" has been released by Stauffer Chemical Company, 420 Lexington Ave., New York 17, N. Y.

This book contains both technical and general data concerning Carbon Tetrachloride and is intended to serve as a ready reference book for those using this product. Some of the technical phases discussed are its specifications, physical properties, azeotropic mixtures, vapor-pressure-temperature relationship of carbon tetrachloride and other chlorinated hydrocarbons, solubility of water in carbon tetrachloride, stability, action on metals, non flammability, solvent power, chemical properties, binary mixtures and the testing of carbon tetrachloride.

A free copy may be obtained on request.

• Joins Industrial Rayon

Dr. J. Bjorksten, President of Bjorksten Research Laboratories, Chicago, announces that Stuart O. Fiedler has accepted a position in the research department of the Industrial Rayon Corporation, Cleveland, Ohio. Mr. Fiedler will remain a director of Bjorksten Research Laboratories, but is resigning as manager of the South Chicago Branch, as of October 1st, 1947.

• Synthesis of Ethylene Urea

A new synthesis of ethylene urea, a chemical compound with reported usefulness in the chemical, textile, leather, pharmaceutical, plastics, paint and adhesives industries, has been made public by Dr. John F. Mulvaney and Ralph L. Evans, of the Evans Research and Development Corporation, New York, N. Y. This new synthesis of the compound was first reported at the Annual Meeting of the American Chemical Society in New York City, September 15-19, although the work actually was accomplished for the U. S. Army Ordnance Department during the early years of the war.

Uses for ethylene urea have been reported, particularly in the field of high polymers. These include:

Condensation polymers with polyhydroxy compounds, useful as finishing agents for textiles and leather.

Alkoxymethyl derivatives, for crease-proofing and waterproofing textiles.

• David Gordon & Co.

David Gordon and Co., Inc., Chemical, Mechanical and Industrial Engineers, 29 Broadway, New York City, announce the election of Mr. Gordon, previously with the M. W. Kellogg Co. and the Interchemical Corp., to the presidency of the company as of July 16th, 1947. The company is actively engaged in handling both domestic and foreign business.

• Plastic Coating of Materials

The coating of materials with plasticized polyvinyl chloride resins by a "paste dispersion method" is the outstanding development of the German coated fabrics industry in recent years, according to a report now on sale by the Office of Technical Services, Department of Commerce.

By this method, the plasticizer, pigments, and resin are merely mixed together and applied to the cloth as a paste, 100 percent solids. The paste is fused under high heat, resulting in a tough flexible film or coating for the fabric. The method is not commercially used in the United States.

The report was prepared by Deforest Lott, technical director of Textile Leather Corp., Toledo, Ohio, and William D. Hedges, research director, Columbus Coated Fabrics Corp., Columbus, Ohio, following their investigation of 19 German coated fabrics firms under OTS sponsorship.

Orders for photostat and microfilm copies of the report (PB-2335; *German Coated Fabrics Industry;* photostat, $4; microfilm, $1; 50 pages) should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C. and should be accompanied by check or money order, payable to the Treasurer of the United States.

Mimeographed copies of the report are available from the Hobart Publishing Company, Box 4127, Chevy Chase Branch, Washington 15, D. C. at $4 per copy.

A report (PB-12467; *German plastics practice;* photostat $25; microfilm $4; 374 pages), previously released by OTS, discusses the I. G. Farben polymer "P.C.U.-P" used with the paste dispersion method, and in addition presents a comprehensive survey of 19 major developments in the field of plastics in Germany. It was prepared by J. N. DeBell, W. C. Goggin, and W. E. Gloor who investigated the German plastics industry for the Office of the Quartermaster General, U. S. Army. The report, in book form and including an index, is available from DeBell and Richardson, P.O. Box 240, Springfield, Mass., at $7.50 per copy.

Copies of the Silver Jubilee Issue are still available at $1.25 per copy

• CLASSIFIED ADVERTISEMENTS •

WANTED: Textile Chemist by one of America's largest trade associations. College degree required. Some experience desirable but not necessary. Write American Institute of Laundering, Joliet, Illinois.

WANTED: TEXTILE CHEMIST for well established small Southern firm to assist in expanding line of textile auxiliaries and finishes. Experience in development or manufacture of textile auxiliaries required. Give full details, including salary requirements. Write Box 302.

POSITION WANTED: Ten years of lab experience with leading dyestuff and chemical manufacturer. Five years of practical dyehouse and lab experience on rayon skeins and cakes. Desire opportunity as technical representative with manufacturer of dyes and chemicals. Age 35. Letter of interest brings resumé. Write Box 304.

WANTED: Chemist, B.S., with at least several years' Research or Development experience on wool; to carry out research and development work on fur. Permanent position for qualified man with large company in vicinity of New York. Salary commensurate with education and experience. Write Box 313.

POSITION WANTED: Woolen and Worsted skein yarn dyer. Thorough knowledge of acid, chrome and alizarine colors for knitting and weaving. Artificial and daylight matchings. Twenty-five years practical dyehouse experience. Age 45. Now connected with one of the long established dyehouses in the East. Write Box 314.

Well known manufacturer of textile processing chemicals and finishes needs representative for central New England. Fine opportunity and future for the right man. Desired qualifications: Age 27 to 38; intimate knowledge of cotton piece goods wet processing and finishing; textile school or college education; good sales personality. Write Box 320.

Leading Manufacturer in New York City invites applications of Graduate Chemists having some experience in protein textile fibers. Write stating qualifications and experience. Write Box 322.

WANTED: YOUR SURPLUS DYESTUFFS
Vat powders, acid, chrome, direct, and naphthol dyes wanted by this substantial organization. Write, wire, or phone Shepard Chemical Corporation, 117 Liberty St., New York 6. Phone: WOrth 2-7839.

WANTED: Experienced finisher on Acetate and Viscose Fabric. Must be thoroughly familiar with all types of Jig Fabrics as well as Plied Yarn Crepes, French Crepes, etc. For Southern Plant. Apply in own hand writing, giving full details of education and experience. Write Box 325.

POSITION WANTED: As superintendent of dyeing. Graduate of Philadelphia Textile Institute chemistry and dyeing course, 1933. Experienced in skein and package dyeing of cotton, silk, viscose rayon, acetate rayon and nylon. Duties have included color matching, supervision of dyehouse laboratory, purchasing of dyestuffs, oils and chemicals, and experimentation with new methods, materials and supplies. Write Box 333.

WANTED: Dye Chemist of University standing with plant experience in Dyeing and Finishing of Rayon and Acetate piece goods. To take control of Dyehouse Laboratory of large Canadian concern. Excellent prospects for competent man. Write Box 326.

POSITION WANTED: Textile Chemist, 42, Ph.D. with long practical experience in bleaching, dyeing, finishing, development and research, at present employed, seeks executive position in mill or laboratory. Write Box 327.

SMALL JIG DYEING & FINISHING PLANT WANTED, OR JIG & BOX PLANT. METROPOLITAN AREA PREFERRED. WRITE BOX 328.

WANTED: Textile Chemist for research in dyeing, printing, finishing, etc., of cotton, rayon and mixed fibers. Either recent graduate of a textile school or university, or with previous experience in this field. Must be research minded. Write Box 329.

WANTED: Colorist-Chemist experienced in Screen Printing who can make formulas for Draperies, Dress Goods and Lastex. Textile Printers of California, 400 East 53rd Street, Los Angeles 11, California.

POSITION WANTED: Quality Controller—The man described in this ad knows the business of rayon dyeing and roller printing forward and backward. He is accustomed to heavy responsibility and is a good trouble shooter in all plant activities. He has creative ability, tempered by long practical experience. His chemical background, skill and experience warrants a fairly high salary. Interested only in a big job that needs doing. Write Box 330.

WANTED: 500 lbs. Fast Pink EB Extra (C.I. 130); Rhodamine B500%, Napthol ASG, ASBS, ASSW, Indigosol 04B, Chrysophenine. EXPORT TRADERS CO., Inc., 576 5th Ave., New York, N. Y. Penn. 6-1982.

WANTED: Colorist. Old established Dyestuff concern offers excellent opportunity for experienced dye tester, capable complete charge laboratory. Write Box 331.

DYESTUFF—CHEMICALS: Top Prices paid for excess and surplus lots, particularly Direct Blacks, Benzo Purpurine 4B, Indigosols, Vats, Malachite Green. Write Box 332.

(Additional Classifieds on Page XXXVI)

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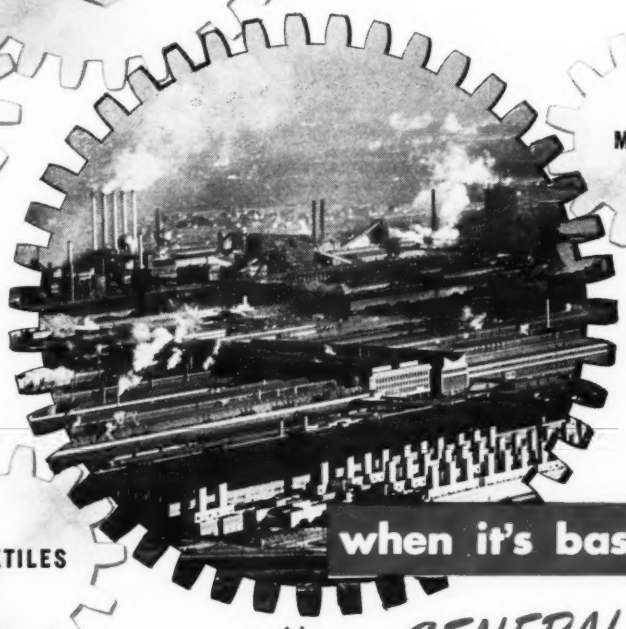

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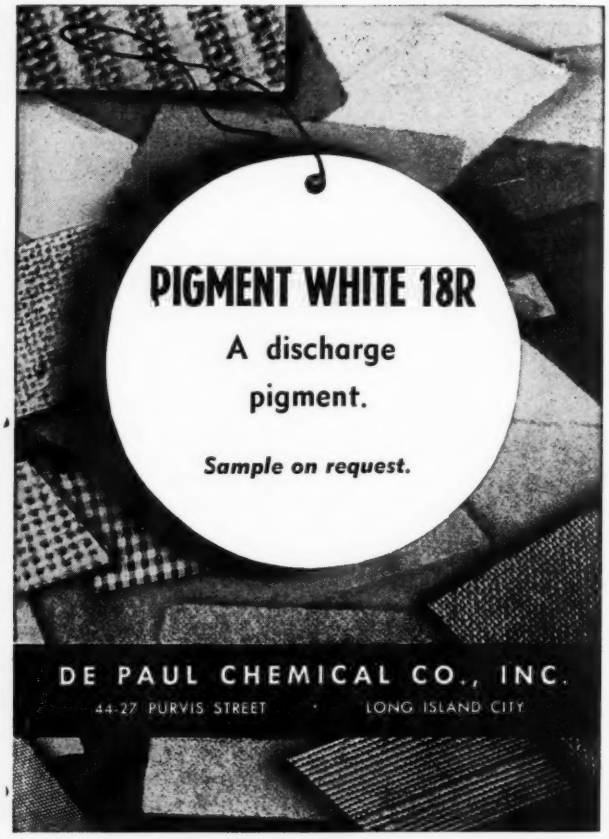

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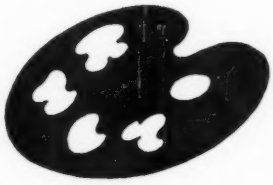

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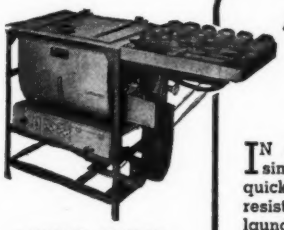

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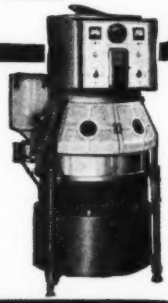

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7. *Penetration* into cloth of various coatings.
8. *Retention of fillers, starch and sizing* in cloth after laundering or cleaning.
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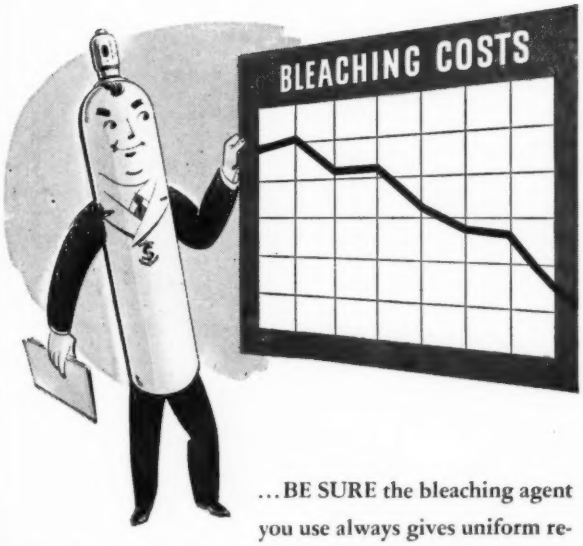

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(For Additional Classified Ads See Page 650)

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Effective January 1, 1948, the foreign subscription price will be $10.00.

Renewals received prior to January 1, 1948, will be accepted at the old rate of $6.00.

THE TWELFTH ANNUAL

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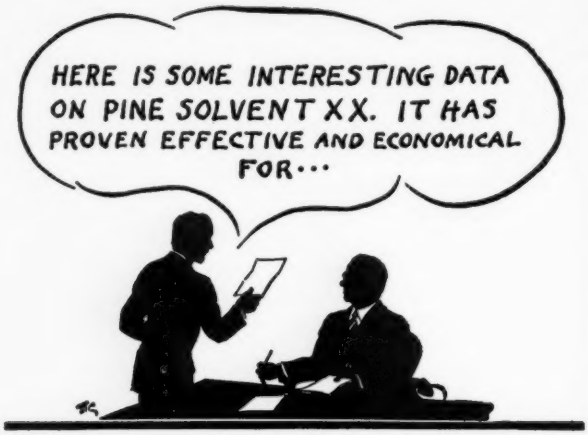

COTTON: In the kier, Pine Solvent XX brings the liquor in contact with every fiber, leaves uniform bottoms that dye and finish more evenly. Boiling time is cut. Fibers are softer, fuller, more resistant to age-discoloration.

WOOL: Pine Solvent XX is valuable in raw-wool scouring . . . irreplaceable in fulling. From the raw stock it produces clean, soft, really white wool in prime condition for storage or further processing. In the fulling mill, it cuts time as much as 30% . . . costs no more . . . helps you meet contract delivery dates on time.

RAYON: In boiling off, Pine Solvent XX rapidly emulsifies gelatinous materials . . . is safe for the most delicate fabrics. Used in dyeing, it makes the fabrics wet out and sink quickly.

DYEING: Pine Solvent XX makes dye liquor penetrate the hardest fibers and heaviest seams. It gives an even, level deposit of dyestuff of uniform depth throughout every fiber. Loose dyestuff and impurities are suspended for washing out completely.

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